NEW ZEALAND
JOURNAL OF
Agriculture
MARCH - 1957
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Weedone and Hi-vol !
Gorse executioners !

Same yellow-peril flowers, same old spiky stems digging in stubbornly over your best land. Everything is the same except your attitude. Now you no longer worry about it. You just get in there with a tankful of Weedone Special and a trusty HI-VOL gun at your side.

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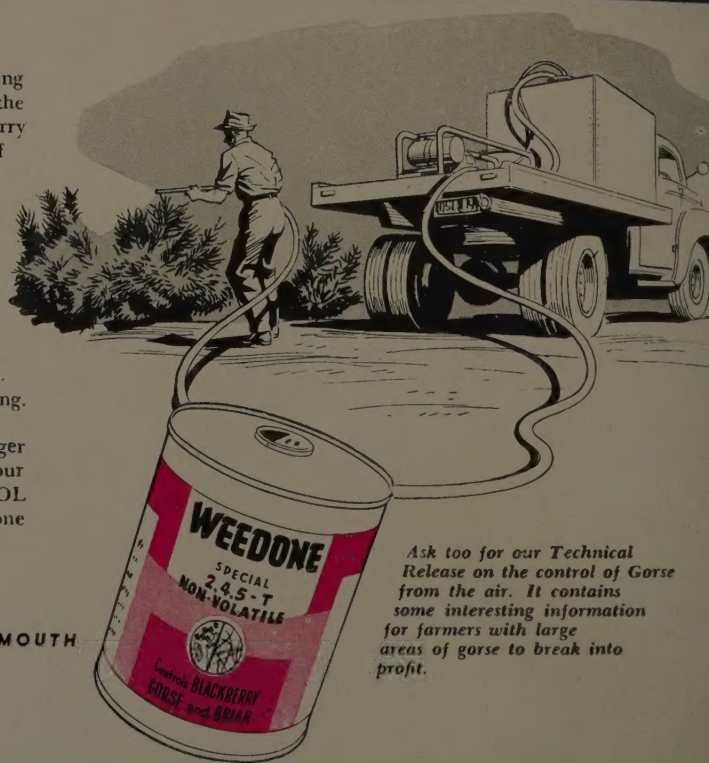

Ask too for our Technical Release on the control of Gorse from the air. It contains some interesting information for farmers with large areas of gorse to break into profit.

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This Month's Cover

A scene during the harvesting of tobacco at Riwaka, Nelson, is the subject of this month's cover from a colour photograph by R. V. Francis Smith. The tobacco leaves are being tied on to sticks by seasonal workers. The sticks of leaves are then hung in a kiln for curing and drying under carefully regulated temperatures. This process takes 5 to 6 days. Only a very small percentage of the leaf is now air-dried. Commercial tobacco growing has shown considerable progress since a Tobacco Board was formed in 1936 and production is now about 4,500,000lb. annually. Mechanisation of the industry is increasing, but picking and tying of the leaf are still done by hand.

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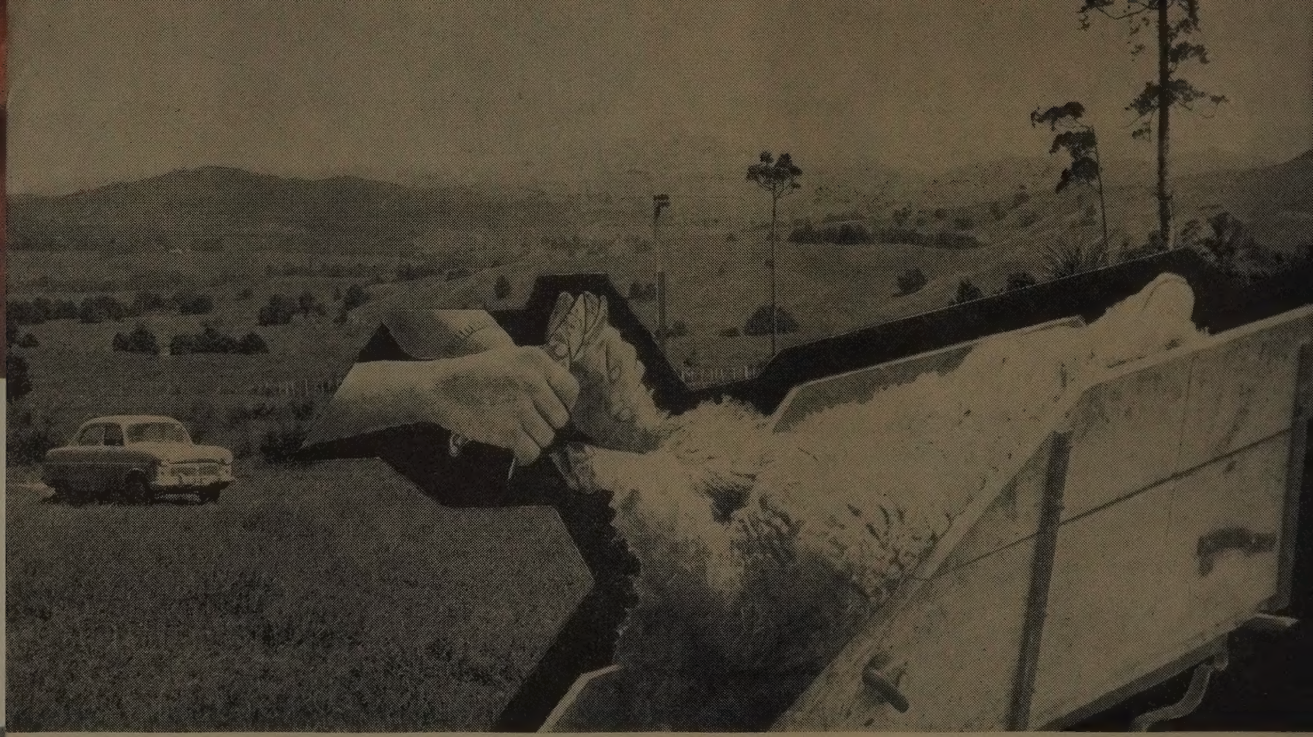


The Purua Foot-rot Eradication Scheme

By C. R. ENSOR,
Veterinarian, Department of Agriculture, Whangarei

FOOT-ROT is responsible for very grave losses in the sheep industry in New Zealand. These losses, from reduced wool and meat production, lowered fertility, and shepherds' time in looking after foot-rot infected sheep, are difficult to measure in terms of money, but recent estimates of the losses due to foot-rot are over £1,000,000 annually. Apart from the financial loss to the industry there is also much pain and suffering to individual sheep resulting from this infection, which at times, through pain, forces sheep to walk on their knees or to lie down and eat what pasture is within reach.

FOOT-ROT in sheep is a contagious disease which is transmitted from sheep to sheep through clean sheep picking up the infective organisms from pasture which has been contaminated from the lesions on the feet of infected sheep.

A very effective scheme for the eradication of foot-rot from flocks was suggested by W. I. B. Beveridge while working at the McMaster Laboratory in Sydney in the early 1930s, but in New Zealand this scheme had never been put into practice on an area basis until the Purua Foot-rot Scheme was conceived.

This method has been described in Department of Agriculture Bulletin No. 325 "Foot-rot in Sheep can be Eradicated", by J. F. Filmer.

Description of Scheme

To demonstrate to farmers that a scheme run on lines suggested by Beveridge was practical on an area basis the Animal Industry Division of the Department of Agriculture, the New Zealand Wool Board, and farmers in the Purua district in Northland combined to eradicate foot-rot in sheep from the Purua district.

The district is 20 miles north-west of Whangarei, is approximately 32 square miles in area, and varies from a few hundred feet to 2000ft. in elevation. The farmed land varies from alluvial river flat to rolling gumland and steeper clay hills, with the highest and steepest country of volcanic andesites and dolerites.

The average rainfall is 60in., though last year this was nearly doubled.

When the scheme was started there were 22,000 sheep in the district in flocks up to 4000 and comprising breeding and fat lamb properties, some of which were run in conjunction with dairy farms.

The objectives were to assess the efficiency of the Beveridge scheme in eradicating sheep foot-rot from an area and to assess the incidence, severity, occurrence, and recurrence of foot-rot in sheep under trial.

The New Zealand Wool Board provided equipment and formalin, farmers provided the necessary labour, and the Animal Industry Division provided the supervision which was carried out by the district Government Veterinarian and four Livestock Instructors. The whole area was divided into four, with a farmers' representative and a Livestock Instructor in charge of each area.

Description of Area

The scheme was started on 16 January 1956, though much preparatory work had been done by Departmental officers beforehand.

HEADING PHOTOGRAPH: A typical scene in the Purua Valley where area control of foot-rot is being carried out. Inset: Handling of sheep in foot-rot control is made easier by the use of this type of holding cradle. Northland Photography photographs.

At a meeting in the area at which the objectives of the scheme were stated, and which was attended by all sheep farmers in the district except three, all except one person agreed to participate; even the three who could not attend had sent word of their willingness to co-operate.

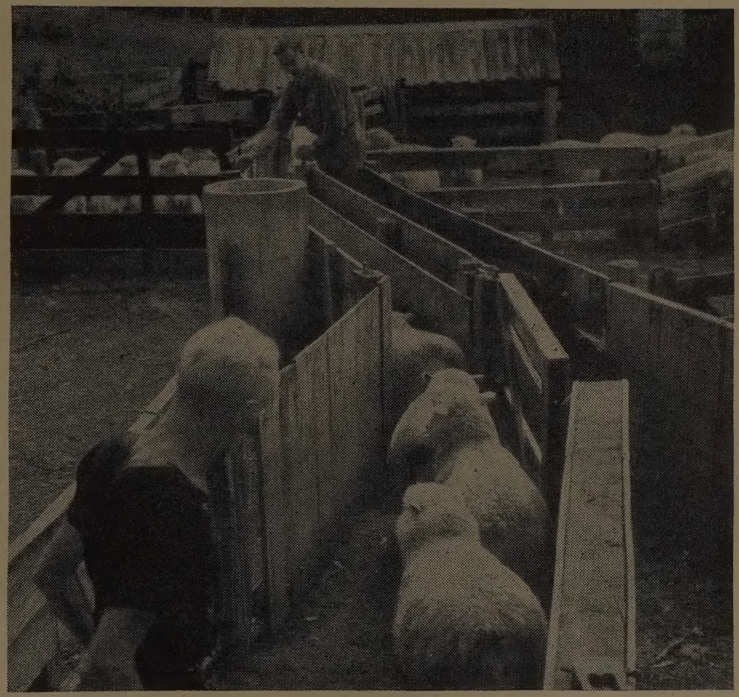
The farmers were visited and asked to make sure their fences and gates were sheep proof. Also, the provision of a suitable foot-rot bath and yards, and hospital, convalescent, and clean paddocks was discussed by the Livestock Instructors.

Goats were coming in on some farms from reservations and the surrounding bush country. These goats were eradicated with the help of the Department of Internal Affairs, which arranged a team of cullers, who slaughtered 367 goats, of which 16 per cent. were infected with foot-rot.

The Purua area is fairly well isolated by rivers, undeveloped gumland, and bush country. A small part of the boundary abuts one sheep property not in the scheme, and part of the boundary abuts dairy farms. Practically no sheep traffic passes through the area on foot, as most of the movement is by lorry.

Foot-rot Scheme

On each farm paddock arrangements were planned, and the whole flock,



[*Northland Photography*

▲ When the sheep are being put through the foot-rot bath any signs of recurrent lameness can be watched for by the farmer and the Livestock Instructor.

INITIAL INCIDENCE OF FOOT-ROT OVER WHOLE AREA

No. of farms	No. of sheep	Free	Doubtful	Infected
30	21,795	2,441 (11%)	10,496 (48%)	8,858 (41%)

INCIDENCE ACCORDING TO FARM SIZE

No. of sheep in flocks	No. of farms	Total	Free	Doubtful	Infected
0-500	12	1,605	66 (4%)	441 (28%)	1,098 (68%)
501-1,000	11	5,287	490 (9%)	2,077 (39%)	2,720 (52%)
1,001-2,000	5	8,261	1,162 (14%)	3,216 (39%)	3,883 (47%)
2,001-3,000	1	2,573	102 (4%)	1,756 (69%)	715 (27%)
Over 3,000	1	4,069	621 (15%)	3,006 (74%)	442 (11%)
	30	21,795	2,441 (11%)	10,496 (48%)	8,858 (41%)

INCIDENCE ACCORDING TO UTILISATION

Type of farm	No. of farms	No. of sheep	Free	Doubtful	Infected
Fat lamb	15	6,263	1,009 (16%)	2,258 (36%)	2,996 (48%)
Store	4	6,933	685 (10%)	4,450 (64%)	1,798 (26%)
Mixed	11	8,599	747 (9%)	3,788 (44%)	4,064 (47%)
	30	21,795			

COMPARISON OF FLOCKS AT ORIGINAL EXAMINATION (JANUARY-MARCH 1956) AND AT OCTOBER 1956

January-March 1956

No. of sheep farms in area	32
No. of farms not in scheme	2
No. of farms in scheme	30

FOOT-ROT INCIDENCE

All farms were infected

Incidence	Sheep	Per cent.
Clean	2,441	11
Doubtful	10,496	48
Infected	8,858	41
Total	21,795	

October 1956

No. of farms withdrawn:	
(a) Handling difficulties	1
(b) Too much mud	1
(c) No facilities	1
	3 (2,919 sheep)
No. of farms still in scheme	27

FOOT-ROT INCIDENCE

Incidence	Farms	Sheep
Clean	19	15,538
Doubtful	6	2,646
Infected	2	3,666
Total	27	21,850

The two infected farms had approximately 45 infected sheep.

Note: Totals do not agree because of introductions and withdrawals.

which was classed as infected to start with, was concentrated in one part of the farm with handy access to the shed, and the remainder of the paddocks were spelled for at least 3 weeks. These clean paddocks were then divided into convalescent and hospital paddocks, and others were left for sheep when they were declared clean. The paddocks were so arranged that the sheep which had been treated could leave the yards from the foot bath for their particular paddocks without travelling over a route already contaminated by infected sheep as they travelled to and from the yards for inspection and treatment.

The first time a foot-rot team started on a property every sheep was examined. The feet were pared to a normal shape, or if foot-rot were suspected, the feet were pared until all doubtful or infected tissue was removed. The Livestock Instructor in charge of each group was personally responsible for grading each sheep according to whether it was free of foot-rot, whether it was doubtful if foot-rot were present, or whether the animal was infected. Also, it was his responsibility to check each foot before the sheep was let out of the

cradle to make sure that the paring had been done satisfactorily.

Sheep were then marked according to the degree of infection and drafted into their respective mobs ready for treatment. All sheep were passed through a formalin foot bath before being taken out to their respective paddocks. The formalin used was 10 per cent. strength for infected or convalescent sheep and 5 per cent. for clean sheep. Wherever possible the sheep were re-examined 3 weeks later when the paring wounds had had time to heal.

To reduce the risk of infection between mobs of sheep clean mobs were put through the foot-rot bath first, followed by the convalescent and then the infected mobs, and care was taken to ensure that no clean sheep passed from the foot-rot bath to their clean paddocks by a route which had already been contaminated by infected sheep. The apparent success of the scheme so far has depended to a large extent on these precautions, and the very careful manner in which the paring and examination of every foot have been carried out.

Some idea of the success of the scheme can be gauged from the tables on page 219.

Incidence of Foot-rot According to Age

Because of the difficulty on most farms of drafting sheep according to age the figures collected were not sufficient to be of real significance, but they would confirm the present belief that infection from foot-rot is lightest in lambs and increases with age.

Rams, also, have a high degree of infection, possibly because they are continually run in the one ram paddock, which once infected is always a source of further infection as long as a single animal in the paddock remains infected.

Severity of Foot-rot

When the sheep in the scheme were examined for the first time they were classified according to degree of infection as follows:—

Group 0: No foot-rot, 2399 sheep (11 per cent.).

Group 1: Discoloration, no softening, or under-run areas (includes all doubtfuls), 10,371 sheep (47 per cent.).

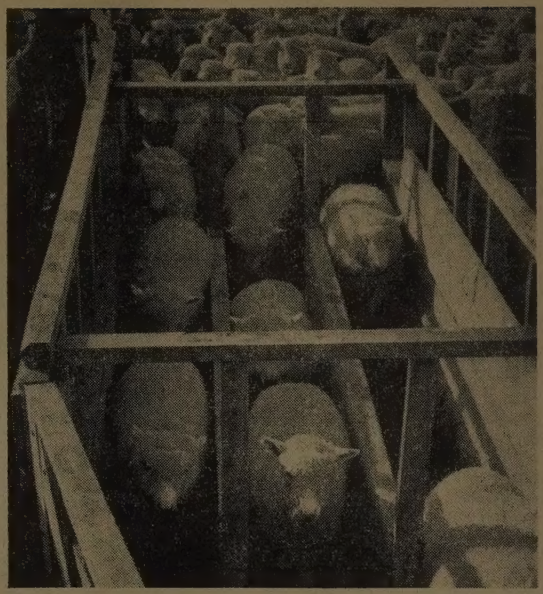
Group 2: Definite softening, under-run areas less than size of halfpenny, 5522 sheep (26 per cent.).

Group 3: Infected areas greater than size of halfpenny, 3503 sheep (16 per cent.).

Rate of Working

Before the scheme was started it was considered that each operator would be able to pare 10 sheep per hour, but the actual average for the scheme was 5½ sheep per hour per man the first time the flocks were examined, and 7 sheep per hour for subsequent inspections.

As the greatest cost in the Purua scheme was for labour, it will be realised that the number of sheep which can be treated per hour is very important.



The work of putting sheep through the foot-rot bath is greatly quickened by the three-way type of bath.

Costs

Costs varied according to the incidence of foot-rot and the efficiency of the teams and farm management. The cost for labour and formalin varied between 1s. 6d. and 3s. per sheep. With one small flock run under particularly difficult conditions the cost was as high as 6s. 3d. The bottom table on this page gives detailed figures of costs.

After the scheme had been in operation for 10 months much valuable information and experience had been gathered.

The results were very encouraging, though it was too early to claim complete success until the flocks had been through a lambing season and been checked after weaning.

Though when the work was in progress last autumn routine farm work often had to suffer, the farmers in the area are now very pleased to have their flocks with sound feet, particularly as this season has been such a wet one with a considerable increase in foot-rot with all its consequential problems on most Northland farms. The table at left gives rainfall data for the area.

RAINFALL DURING FIRST 9 MONTHS OF SCHEME

	Whangarei Wet days	Whangarei Rainfall in.	Pipiwai Rainfall in
Jan.	18	6.69	7.29
Feb.	19	4.91	3.90
March	18	3.18	1.95
April	29	21.94	11.58
May	28	22.03	14.16
June	24	8.99	9.83
July	21	10.37	10.76
Aug.	23	12.01	10.35
Sept.	18	5.22	6.84
	198	95.34	76.66

DETAILS OF COSTS IN FOOT-ROT ERADICATION SCHEME

Flock	No. of sheep in flock	Foot-rot in flock initially Per cent.	Total sheep cradled during eradication	Total man-hours foot-rotting only	Over-all sheep handled per man-hour	Cost of labour at 6s. per hour £	Formalin used (150 sheep/gal. at 12s. gal.) £	Total cost of labour and formalin £	Cost per sheep for labour and formalin s. d.
1	1,996	74	6,785	917	7.4	275	27	302	3 1
2	1,114	13	2,827	390	7.2	117	12	129	2 4
3	844	28	1,860	200	9.3	60	7	67	1 7
4	4,068	11	8,898	921	9.5	276	36	312	1 6
5	2,573	27	6,198	941	6.6	282	25	307	2 5
6	512	42	1,666	251	6.7	75	7	82	3 2
7	1,690	34	5,439	775	7.0	233	22	255	3 0
8	254	97	1,133	245	4.5	74	5	79	6 3

Agalactia, or Sows with No Milk at Farrowing

THOUGH agalactia, or the failure of a sow to produce milk at farrowing, is not common, it is a serious problem for the pig producer when it occurs. This article by the Animal Industry Division discusses some causes of this complaint and gives advice on its prevention and cure.

CASES of agalactia, or of sows at farrowing having no milk, occur from time to time and most pig farmers have experienced this trouble. It occurs in all pig producing countries and can be caused by a variety of conditions, some of which can be effectively dealt with and are fairly easy to diagnose, whereas others present considerable difficulty.

The known causes of agalactia can be conveniently divided into three groups. First, where faulty management is the cause; secondly, where disease is the main factor; and thirdly, where failure of the sow's glands to function and hereditary factors are involved. In all cases it is advisable to obtain veterinary assistance as soon as possible, as no time must be lost if heavy losses in piglets are to be avoided.

Heading photograph by National Publicity Studios.

Faulty Management

In the faulty management group causes of the trouble can be attributed to the following:—

1. Constipation: This is often seen in the heavily in-pig sow, and when a sow is really constipated just before farrowing she will not give much milk. Exercise right up to farrowing and grazing on good clover pasture will prevent constipation. Food should be limited in quantity for the last week before farrowing and for 3 days after, and plenty of clean drinking water should be available at all times.

2. Cold: If the sow is severely chilled and farrows under very cold and wet conditions, her milk supply is likely to be seriously affected. A warm house and warm, dry bedding will generally effect a cure.

3. Sore teats and sharp eye teeth: A sow, though appearing to have plenty of milk, will sometimes refuse to allow her piglets to suckle. This may be caused by the sharp eye teeth of the piglets hurting the sow when the piglets suckle, to the sow having sore teats, or to a combination of both. The eye teeth of the piglets can be cut off easily at gum level with a small pair of side-cut pliers, and any good teat salve used in the cowshed, or petroleum jelly, will assist in healing sore teats on the sow.

4. Poor feeding of the in-pig sow: A starvation diet while the sow is carrying the litter is the hall-mark of thoroughly bad management. It will greatly reduce the milk supply at farrowing and also generally greatly reduce the number of live pigs in the litter.

These four cases of failure of the sow's milk supply can be avoided easily by correct management.

Diseases Causing Agalactia

Diseases that bring about agalactia comprise the next group. This article

Dry sows grazing on good pastures.

deals with cases of sows that have no milk at farrowing only and not with failure of the milk supply at later stages in suckling. Disease as a cause of agalactia is fortunately not very common and the diseases listed are given alphabetically, as it would be difficult to place them in order of importance.

Mastitis

The commonest form of mastitis is that which causes hardening of one or more of the milk glands, generally without a great deal of inflammation. Treatment of this is possible with antibiotics and sulpha drugs, but a veterinarian should be consulted.

Another cause of chronic mastitis, though rare, is actinomycosis. This is caused by a fungus closely allied to that which causes woody tongue in cattle. Cases of acute mastitis are occasionally met with and these can be very serious. It can occur up to 48 hours after farrowing and is characterised by high fever, loss of appetite, and hot, painful swelling of the udder. The sow quickly becomes toxic and has great difficulty in standing at all. If veterinary attention is not obtained quickly, the sow will undoubtedly be lost.

Milk Fever

Milk fever is not common in sows. The symptoms are the same as those of milk fever in dairy cattle: grinding of the teeth, frothing or dribbling at the mouth, drowsiness, staggery gait, paralysis and semi-consciousness, and eventually complete coma. Milk fever responds almost immediately to injection of calcium-borogluconate and the same outfit as is used for cattle is suitable. The dose is about ½ pint for a medium-sized sow.

Farmers must distinguish between milk fever and other conditions, as the treatment is quite different.

Retained Afterbirth

When afterbirth is retained the sow will lose appetite, run a high temperature, and there is generally a discharge of pus from the vagina. Veterinary assistance should be obtained as soon as possible, because if dealt with early, this condition is fairly easily treated, but if it is neglected, the loss of the sow is extremely likely. This, in effect, is a septic infection of the uterus and can lead to general septicaemia.

Other Causes

Finally, there is the group of causes of agalactia that come under the heading of improper functioning of glands and hereditary defects.

In these cases the sow appears to have nothing wrong with her and to be normal except that there is no milk for the piglets. When the udder appears to be normal, but the behaviour and empty appearance of the piglets shows that no let-down of milk is occurring, injections of glandular extracts, under veterinary advice, will generally result in an immediate let-down of milk and no further trouble will be experienced. Occasionally a second and even a third injection may be necessary.

In some cases, particularly with maiden sows, the sow will make no udder at all. This is due to glandular disfunction and little can be done except to rear the litter by hand. When this occurs in a maiden sow it is generally worth while to get the sow in-pig again, as she will frequently be normal at her next farrowing. A second failure means that the sow must be culled.

The principal hereditary defect that prevents a sow from suckling her litter is inverted teats. When breeding sows are selected the closest attention should be paid to the teats and any signs of inversion should mean the rejection of the sow for breeding. Inverted teats are a serious fault and no breeding stock should be selected from any strain known to have this defect.

There are, of course, poor milking strains among pigs, and good milking qualities are of the greatest importance in the selection of breeding stock.

Good management of the in-pig sow can help considerably in preventing agalactia. Particular attention should be paid to young sows in-pig with their first litter, and care should be taken to see that they do not get too fat and get plenty of exercise and good grazing. They should be fed as balanced a ration as is possible, consisting of skimmed milk, the quantity depending on the condition of the sow, and at least ½lb. to 1lb. of a good meal mixture. A suitable meal mixture would be 1 part of meat meal, 1 part of buttermilk powder, and 8 parts of barley meal. The addition of 1 part of bran, if obtainable, would be very useful.

Clean drinking water should be available at all times to in-pig sows.

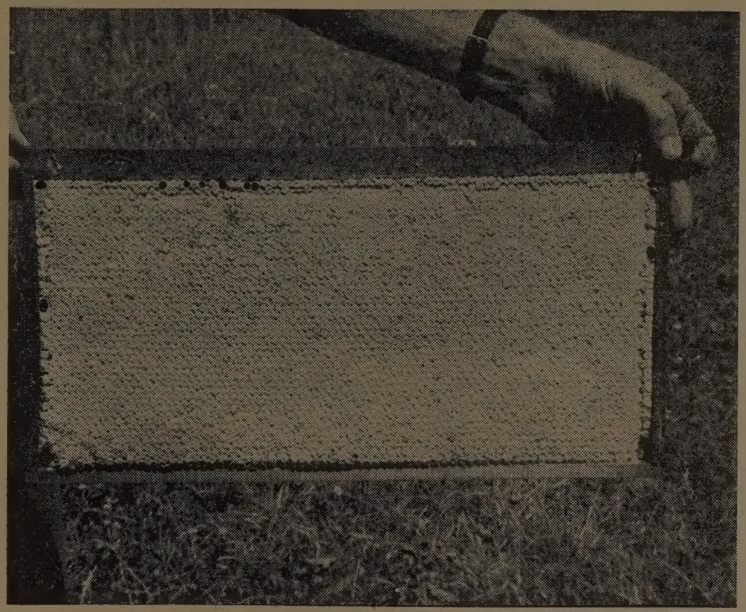
Sows should be put in their farrowing quarters, which must be warm and dry, a week or 10 days before they are due to farrow, and the amount of food they are given should be reduced during the week before farrowing. No food but clean drinking water only should be given for 24 hours before farrowing and 24 hours after. Sows must be handled very quietly and care should be taken to see that they do not suffer any upsets at this time.

Proper Preparation of Honey for Market

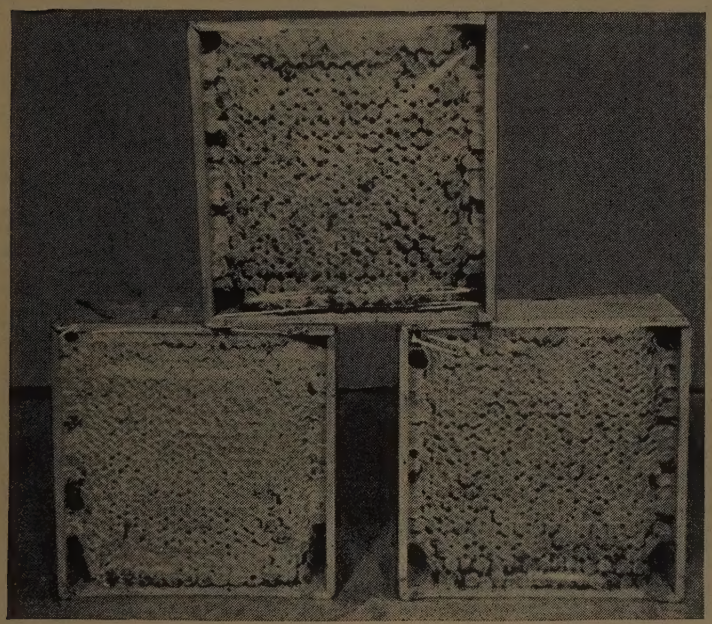
Seasonal Notes for the Domestic Beekeeper

ALL primary products require some attention and preparation to make them suitable for sale on the local market, and honey is no exception. There is a great difference between honey that is carefully handled and processed before being placed in retail containers and that which is immediately packed after extraction and placed on the market without any thought as to its condition when it reaches the consumer. In this article A. W. Bennett, Apiary Instructor, Department of Agriculture, Hamilton, describes how to handle honey so that it reaches the local markets in its most attractive condition.

DEPENDING on the amount of honey that has been harvested, the domestic beekeeper can either dispose of his crop almost immediately after extraction or run the honey into storage tins and repack it later when there is perhaps a better demand for it.



Extracted honey comes from combs such as this.



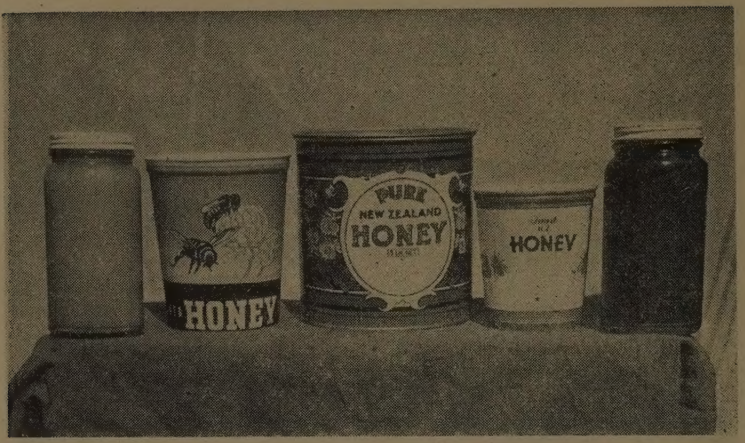
Sections of honey wrapped in transparent wrapping material ready for display.

Texture of Honey

A physical change generally takes place in honey after it has been extracted. This is the formation of fine crystals which may gradually grow larger and larger according to the time it takes the honey to change from a liquid to a solid. Honey that takes several months to granulate will be coarse grained or sugary, and honey that can be encouraged to go firm in a few days will generally have a smooth texture.

Beekeepers, therefore, who decide to dispose of their honey soon after extraction and while it is still liquid should realise what is likely to happen to the honey if it is not consumed within a very short period. As the average honey eater very much dislikes coarse-grained honey, the beekeeper should endeavour to sell only small lots of liquid honey. If larger quantities are sold, the purchasers should be told how to reliquefy the honey if it begins to granulate with coarse crystals. This can very simply be done by placing the container in hot water until the honey becomes liquid again. Care should be taken that the temperature of the honey does not go above about 120 degrees F.

Honey that is sold in glass jars should be warmed to about 120 degrees F. and then carefully strained.



On the right is a jar of clear honey as extracted from combs. The honey in the jar on the left has been granulated after processing. The three containers in the centre are suitable for retail markets.

After it has been allowed to settle for an hour or so it should be thoroughly skimmed to remove froth and fine particles of wax. It can then be put into clean jars. Honey packed in this manner always looks most attractive.

Temperature Factor

Commercial beekeepers have found that the only satisfactory way of placing granulated honey on the market soon after extraction is to install a cooling room to create conditions favourable to quick granulation, thus ensuring a smooth-grained product. Though the domestic beekeeper cannot afford this expense, he can turn out a very good-conditioned honey if he is prepared to wait for cooler weather, generally after March. This means that after extraction the honey should be run into 60lb. tins. As soon as cooler weather is experienced with temperatures dropping below 50 degrees in the evening a beginning can be made to recondition the honey before packing it into retail containers.

Straining

A small tank fitted with a honey gate will be required. If none is available, the honey extractor could be used if the baskets and revolving mechanism were taken out. The inside of the extractor should be given a good clean. On top of the extractor a piece of fine muslin or strainer cloth should be tied securely. If the cloth is new, it should be given a good wash to remove any dressing.

The honey in the 60lb. tins will require to be warmed before it is strained; also granulation will probably have begun and sufficient heat to melt the coarse crystals will be required. The household copper is suitable for holding a 60lb. tin. The honey should be brought to a temperature of about 120 degrees F. Stirring at intervals will help to hasten the warming-up process.

When thoroughly liquid the honey is poured over the strainer into the tank. Make sure the honey gate is closed. The honey should be allowed to settle in the tank for about 12 to 24 hours. Any froth that has come to the surface can then be skimmed off.

Granulation

The next process is to granulate the honey with a fine, smooth grain. About 6lb. of starter to every hundredweight of honey is required. Starter honey is a smooth-grained honey retained from the previous season or bought from a source where the honey is known to be suitable. If this honey is very hard, it can be slightly warmed to allow it to be broken down into a stiff paste. It should not be overheated or the smooth grains will be destroyed.

This starter is now placed in the tank with the rest of the honey and well stirred to get it evenly incorporated. The honey should be well stirred several times a day. If the temperatures are right, in 2 or 3 days the honey should have become quite cloudy and stiff and is ready to put into containers for the retail market.

Honey will readily absorb moisture from the air and should always be kept well covered.

Book Review

"Competitive Farming": M. McG. Cooper

PROFESSOR M. McG. COOPER is a New Zealander who was educated at Massey Agricultural College and for some time lectured at that College. In 1947 he was appointed Professor of Agriculture at Wye College (University of London), Kent, and in 1954 Dean of Agriculture, University of Durham, Newcastle-upon-Tyne. At both of his appointments in England he has had large farms under his management and is well qualified to speak on both theoretical and practical grounds on a wide range of agricultural matters in New Zealand and England.

Professor Cooper uses his wide experience to advantage in this book. He lives up to his reputation of being outspoken, particularly concerning weaknesses in the efficiency of English farming methods and the dangers of reliance on high farming subsidies. He draws heavily on his New Zealand experience and makes many comparisons between farming, marketing, research, and extension methods in New Zealand and Great Britain. Most of these comparisons are to the advantage of New Zealand and perhaps Professor Cooper has been somewhat over-critical of certain aspects of the farming picture in England and sees the corresponding conditions in New Zealand in too favourable a light. A New Zealander might wonder why there has not been a large migration of farmers from Great Britain to New Zealand. Perhaps it is the subsidies that keep them in England.

The book is written primarily for the British farmer and farming administrator and will probably have a rather limited appeal in New Zealand. For those familiar with British farming, however, it will be read with intense interest. These readers might not agree with all that is said, but they will surely admit that there is much that is sound common sense and that needed to be said. Time after time the author warns against the dangers of supporting inefficiency with farming subsidies. He shows the folly of too great a reliance on imported feeding stuffs and the corresponding neglect to grow and use grassland to the best advantage.

It would be interesting to read a book on New Zealand farming by a British author with as wide an experience of both countries as Professor Cooper's.

—*P.B.L.*

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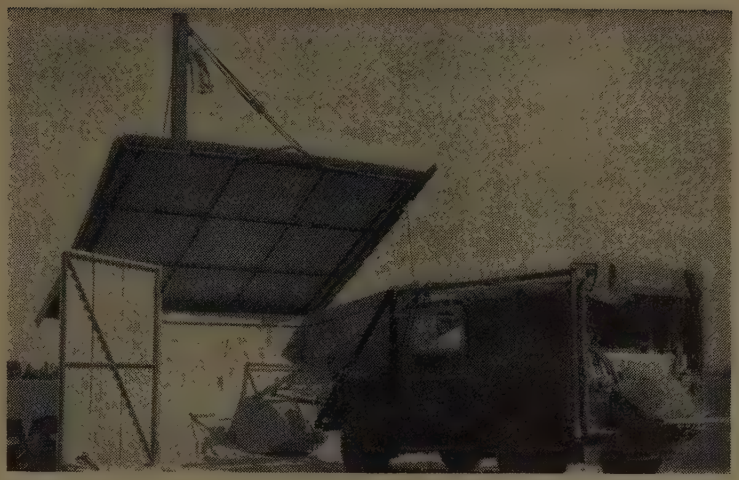
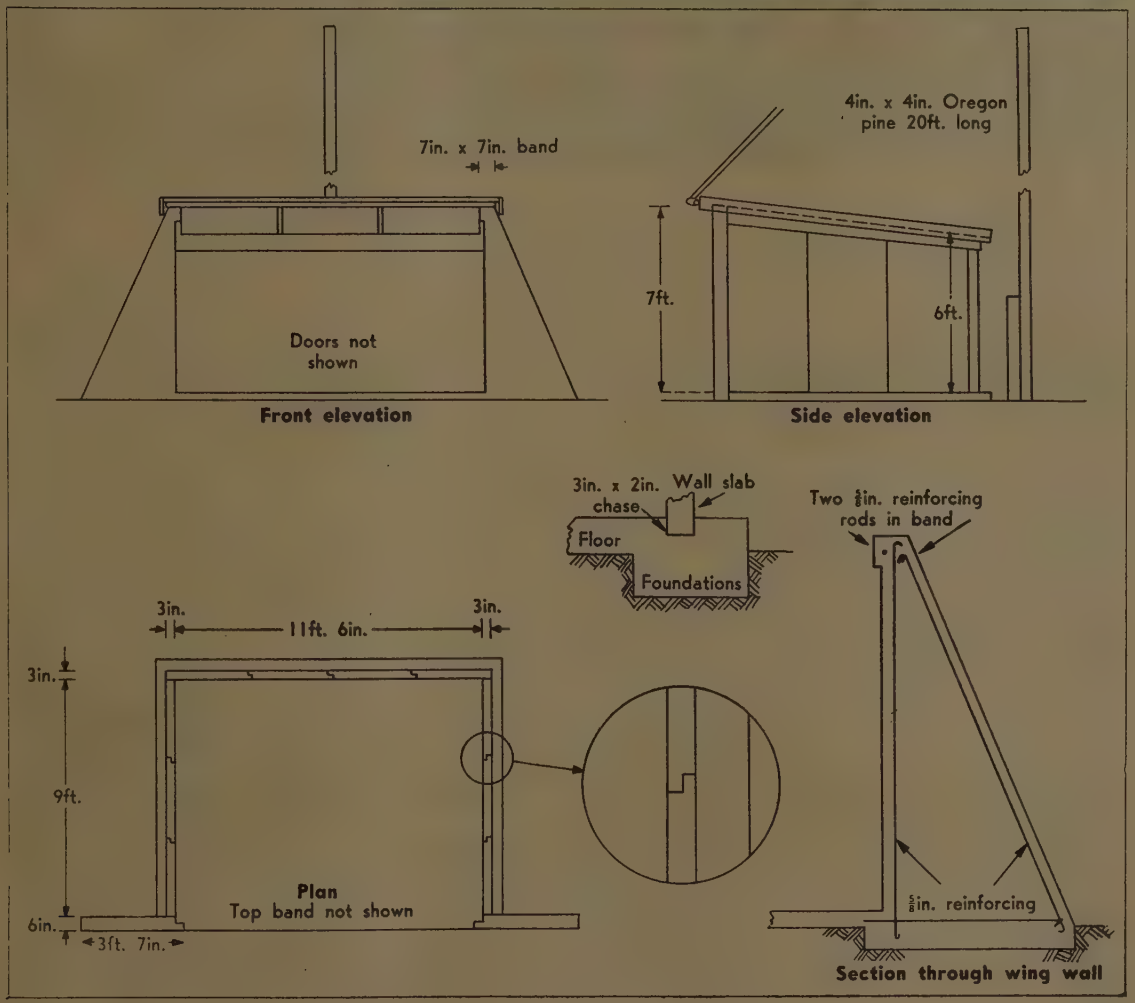
Bulk Superphosphate Silo

By J. D. EADEN,
Fields Instructor, Department of Agriculture, Ashburton

THE tremendous increase in aerial topdressing over the last few years is shown by the fact that in 1955-56 405,000 tons of fertiliser were spread by this method compared with 5000 tons in 1949-50.

AERIAL topdressing is done not only on hill country or steeper downlands farms where alternative methods cannot be used, but is used also on flat





BULK SUPERPHOSPHATE SILO

country where farms are irrigated and borders and head races make spreading by truck difficult. On some other flat areas large stones or scrub make difficulties for land-operated machinery.

Owing to the speed with which fertilisers are spread from the air, there are many advantages in bulk handling; it saves labour and bags and there is a reduction of about £1 per ton on the listed price. There is need therefore for on-the-spot storage for bulk fertiliser.

On the preceding page are constructional details and plans of a bulk superphosphate silo built in Mid-Canterbury by the estate of A. Sim on an irrigated farm. The cost of the building was about £110, excluding the farmer's own time on the job and in welding the doors and roof. The capacity of the silo is about 11 tons, but more fertiliser can be held if the front of the silo is built up with boards.

The materials required are:—

Shingle, 6 cub. yds.

Cement, 22 bags of imported or 26 bags of New Zealand.

Corrugated iron, eight 8ft. lengths and eight 5ft. lengths for the roof; six 7ft. lengths for the doors

Steam piping, 21ft. of ¾in., 54ft. of 1¼in., and 44½ft. of 1in. for the roof; 77½ft. of 1in. for the doors

Reinforcing steel, 1¼cwt. of ⅝in. and 1¼cwt. of ½in.

The concrete foundation and floor were poured at the same time to form a slab 13ft. x 10ft. with a 3in. x 2in. chase around three sides 6in. in from the edge of the slab. This chase forms a footing for the wall slabs. The wall slabs were precast in reinforced concrete 3in. thick and 3ft. wide on the floor slab and then lifted into place when dry. The mould for the slabs was formed by placing a 3in. x 2in. board, cut to shape, on the concrete floor. The edges of the slabs are halved to make a watertight joint when in place and all joints are sealed with asphalt jointing compound. When all the slabs were erected a 7in. x 7in. top band of reinforced concrete was poured and in conjunction with this two reinforced piers with wings to brace the front were made.

The piers to support the wall panels are carried past and round the walls and also underneath to form a strong and solid support to carry the heavy doors. It is essential that the reinforcing for the band and the wings should tie the two units together. When the boxing is erected provision should be made to form a ledge up the inside of the pier so that planks can be fitted behind the ledge, thus allowing more superphosphate to be stored. The mixture for the concrete work was 7 : 1.

The roof is made of 1¼in. steam piping braced with 1in. and ¾in. steam piping and covered with galvanised iron. The whole roof unit is hinged at the back as shown in the photograph above so that it can be lifted to allow trucks with superphosphate to get in the silo. The doors are similarly constructed, but with 1in. steam piping. A 20ft. length of 4in. x 4in. Oregon pine bolted to a steel post and fitted with a block and tackle is used to raise and lower the roof.

Farmers who are considering aerial topdressing will find many advantages in installing a bulk superphosphate silo of the type described. It is cheap, convenient, and labour saving to aerial topdressing firms, transport operators, and farmers alike.

During the lambing season these silos can be most useful in stormy weather. If a bale of hay is thrown in, lambs can be sheltered, and saving the lives of even a few lambs will more than pay the interest on such a building.

COMMONWEALTH ECONOMIC COMMITTEE

Wool Production and Trade, 1952-56

This volume, produced by the Commonwealth Economic Committee, London, is the third in the post-war series, the last edition having appeared in 1951. The present volume, which has been expanded considerably in scope, surveys in detail the latest developments affecting world sheep numbers, wool production, consumption, prices and stocks as well as the trade in raw wool of both exporting and importing countries. The seasons covered are from 1947-48 to 1955-56, together with pre-war averages for comparison. Particular attention has been paid to the sheep and wool industries of the Commonwealth. Price 12s. 6d. (13s. 3d. including postage).

Meat, 1956

An annual volume in the Commodity Series of the Commonwealth Economic Committe, London. Reviews world production, consumption, trade and prices for all types of meat, offals and livestock and examines the measures of various Governments having a bearing thereon, such as marketing schemes, prices and subsidy arrangements, trade agreements and import duties. Price 5s. (5s. 7d. including postage).

Dairy Produce, 1956

An annual volume in the Commodity Series of the Commonwealth Economic Committee, London. Reviews world production, consumption, trade and prices for all kinds of dairy produce including milk, butter, cheese, condensed milk, milk powder, casein, eggs, egg products and margarine. Examines the measures of various Governments having a bearing thereon and gives details of import duties in the main importing countries. Price 5s. (5s. 7d. including postage).

Fruit, 1956

An annual volume in the Commodity Series of the Commonwealth Economic Committee, London. Reviews world production and trade for fruit and deals individually with the main kinds of deciduous and citrus fruit, bananas, grapes, pineapples, canned fruits, dried fruit, fruit juices and wine. Gives fruit consumption and utilisation figures for the United Kingdom and certain other countries, and information about tariffs, import quotas, licensing arrangements, import duties and trade regulations of the United Kingdom and Western European countries. Price 5s. (5s. 7d. including postage).

Orders for these publications should be sent direct to: The Secretary, Commonwealth Economic Committee, 2 Queen Anne's Gate Buildings, Dartmouth Street, London, SW1.

The Handling and Marketing of Shell Eggs

HIGH quality in shell eggs sold to the public is of paramount importance as a factor in efficient marketing and increased sales. The prosperity of poultry producers depends markedly on the public buying more eggs; consequently it must be a first objective of both the producer and the egg distributor to offer the best grade of egg possible. In this article by F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, which will be concluded in next month's issue, factors which can affect egg quality and are under the control of producers are discussed.

THE quality of eggs can only be as good as the weakest link in the long chain in their production, handling, and distribution. Any weak link can be to the detriment of egg sales and ultimately it will have its effect on the pockets of producers.

The major responsibility for quality faults does not necessarily rest with producers. Producers, distributors, retailers, and indeed housewives must accept a quota of blame for spoiling eggs which were produced in perfect condition. The allocation of blame, however, is a negative approach to a problem which requires co-ordinated and co-operative effort on the part of all, aided by a greater knowledge of the factors involved in preserving quality.

Only when producers are doing their part to raise the average quality of eggs can they exert effective pressure on others to obtain a higher degree of efficiency in the distribution of good-quality eggs.

Heading photograph by Sparrow.

What is Egg Quality?

As opposed to high-grade eggs, there is a range of eggs in which the quality has deteriorated as is indicated by a reduction of the quantity and density of the thick white or albumen which surrounds the yolk, the sinking of the yolk itself, and the breaking down of the air cell, which becomes tremulous or floating. Eggs in this state of deterioration can be caused by a number of factors to be considered later.

Though these eggs are not bad, they are often described by the public as being bad and lead to complaints, which in many cases are more serious than the condition of the eggs warrants. By extra care and efficiency in both production and distribution a high proportion of such eggs can be avoided, as is demonstrated in overseas countries, in particular the United States of America and Canada. Though this may not be possible "over night" in New Zealand, it should be the objective.

Finally, there is the menace of the bad egg—the egg whose content is decomposing. This decomposition is caused by bacterial and/or fungoid action and the initial infection of affected eggs can be traced in a number of instances to the producers.

Such eggs cause serious complaints and do most to depress egg sales. Thus it is essential that the factors which cause deterioration in egg quality and bad eggs should be studied and understood.

BEFORE EGG IS LAID

Egg quality is influenced before an egg is laid. Both breeding and feeding can influence egg quality. Breeding has perhaps less influence and economically is more difficult to control.

The Shell

There is a significant tendency for shell texture or condition to be an

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inherited characteristic. This is mainly on the basis of the individual bird and not on the basis of a strain or to any marked extent within a family.

Pullets completing their first laying season do not always lay eggs with shells as strong as those laid earlier in the season. Consequently a check on the quality of shell texture shortly before pullets go into a moult will reveal those which have stood up to the strain of production over the laying year in this respect and in consequence are desirable future breeders, other characteristics being satisfactory.

This type of check on shell texture is more effective than the check usually made during the hatching season, when poor-shelled eggs are discarded for incubation. On the other hand a check on pullets in late summer is really practical only on a breeding farm where trapnests are available.

Eggs of differing shell texture show little variation in keeping qualities, extremes excluded. For instance, the Department of Agriculture demonstrated conclusively that mottled-shelled eggs, previously suspected as giving poor-quality eggs, keep as well as normal-shelled eggs. However, shell texture influences the number of cracks experienced during handling, both hair cracks and broken shells. Hair cracks give bacteria and moulds easy access and can be a significant weak link in handling and marketing.

Albumen Quality

The physical quality of albumen in eggs is an inherited characteristic. Strains of birds may be bred to provide for albumen quality. The quality of albumen tends to deteriorate as the laying season progresses; hence recent investigations in the United States indicate that eggs from pullets should be checked toward the end of the laying season, where the intention is to develop a strain of birds giving high, average, albumen quality. Thus on a breeding farm a simultaneous check could be made for shell texture and albumen quality in late summer.

The two inherited characteristics of albumen and shell quality described may well be considered by pedigree breeders in the near future.

Infertile Eggs Needed

Marketing of fertile eggs is undesirable except during the incubation season, when the practice cannot be entirely avoided. A germ which starts to develop in such eggs and then dies is a possible focal point for bacterial infection. The germ can start to develop at 68 degrees F., a common temperature in summer.

Blood Spots

Most investigators consider that the tendency or predisposition for birds to lay eggs containing blood spots is inherited in some birds. Thus the candling of eggs intended for incubation can assist in eliminating those birds which have this predisposition.

During 1935 the writer was responsible for an investigation into the effect of egg faults on the hatchability of eggs. Between May and September of that year 27,139 eggs from hens and pullets were candled and 466 eggs with blood spots marked. The normal eggs gave 18.1 per cent. infertility and 63.1 per cent. hatchability of all eggs set, and those with blood spots gave 23.5 per cent. infertility and 47.2 per cent. hatchability.

Between October 1935 and January 1936 a further 26,324 eggs were candled and 170 blood spot eggs marked. The normal eggs gave 11.3 per cent. infertility and 69.3 per cent. hatchability of all eggs set. The comparable figures for the blood spot eggs were 22.3 per cent. infertility and 53 per cent. hatchability of all eggs set. Thus the removal before incubation of blood spot eggs removes eggs of low hatchability and lessens the chance of the characteristic being inherited.

[*Robertson*

A type of communal nest box. A good depth of clean, dry litter is a feature.

Influence of Food

The influence of food on egg quality is unquestionably an important factor, but statements on the subject unsupported by evidence are too often made. Such statements can be misleading and often harmful.

Quality of Food and Ration Fed

It has not been established that the quality of food fed or the ration fed has any effect on the internal quality of an egg (keeping quality or marketing potentiality), presuming that the reference is to foods available and in common use in New Zealand, and excepting yolk colour and possibly the occurrence of blood spots. Yet it is stated that poor-quality mashes are responsible for some faulty and poor

Influence of Diet on the Shell of an Egg

Most poultry producers appreciate that food plays a significant part in shell formation. Thin shells and shells of poor texture lead to an excessive proportion of cracks and consequently it is essential to ensure that the diet of laying birds contains adequate calcium, phosphorus, and vitamin D.

It is common practice to include 2 per cent. of calcium carbonate-rich mineral in laying mashes, but this should be augmented by permitting the birds to have free access at all times to oyster shell, limestone grit, or some other calcium-rich grit. Birds' requirements of calcium vary according to the rate of egg production and consequently they should be able to adjust their intake accordingly.

Birds in laying cages should receive at least 4 per cent. of calcium carbonate in their mash if satisfactory egg shells are to be obtained. Any weakness in the egg shells of laying cage birds can and often does lead to an

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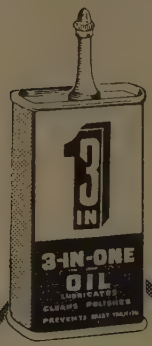

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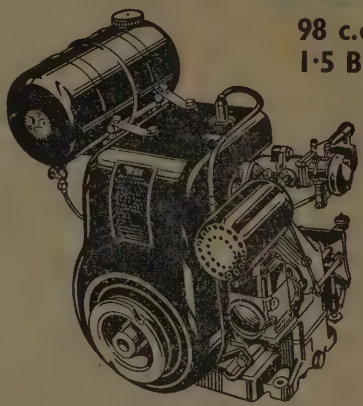

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excessive number of cracked eggs when they are being laid.

As well as adequate calcium for the laying hen the bird must receive sufficient vitamin D for it to be able to make proper use of this mineral. In general producers watch this, but it is sometimes overlooked and trouble results.

Phosphorus is important in shell formation. A correct balance between calcium and phosphorus must be maintained in a ration fed to laying birds for the best level of production and satisfactory egg shells to be obtained. The National Research Council recommends that laying birds should receive 2.25 per cent. of calcium in their ration balanced by 0.75 per cent. of phosphorus.

In high-efficiency mashes, which are remarkable for their low content of pollard and bran—foods which contain phosphorus, it is essential that the phosphorus content should be calculated and checked and any deficiency rectified. A phosphorus deficiency may well occur unless this is done.

Manganese has been shown to have an influence on shell condition. Where substantial quantities of bran and wheat are fed, in general the requirements of laying birds are adequately met. Here again where high efficiency mashes, low in bran content, are in use the manganese content of the ration should be checked. It should be kept in mind that the manganese content of wheat varies.

A shortage of manganese can easily be rectified by the use of a mixture of common salt and manganese sulphate in the proportion of 4oz. of manganese sulphate to 10lb. of common salt, where 2 per cent. of this mixture is added to a mash.

Trouble with egg shells can occur when laying birds are dosed with drugs such as those of the sulphonamide group.

The first stage at which eggs may be dirtied or damaged on the farm is in the nest boxes. An ample number of a good type of nest boxes, well filled with nesting material, and kept clean and well cared for as are those shown above, keeps this type of economic loss to a minimum. Neglected nest boxes such as those below cause unnecessary dirtying and breaking of eggs.

Blood Spots and Diet

Extremely little has been written on feeding as applied to blood spots. It is perhaps significant that blood spots often appear in increased numbers when birds are laying at a high level; consequently it can be suggested that a ration which stimulates high production can at the same time result in an increase in blood spots. In general, however, it seems impossible to advise a poultry farmer on a feeding programme to control blood spots in eggs he markets. No weight of evidence can be found to support a contention that feeding is a primary factor in the occurrence of blood or meat spots in hen eggs.

Taints and Diet

Taints in poultry food were investigated in Queensland, Australia, some 3 years ago, when it was found that it is not desirable to feed grain to laying birds that has been treated with commercial or deodorised BHC, as eggs from birds fed with the treated grain were tainted. An instance of eggs tainted in this manner has come to the notice of the Department of Agriculture.

There is no evidence to show that fish meal fed to laying birds will taint the eggs, irrespective of the quantity fed in a mash; in fact, there is positive evidence to show that fish meal does not taint eggs through the laying bird.

Yolk Colour and Diet

Much attention has been focused on yolk colour and the relative palatability of eggs. When it was the prac-

[*Niederer*

To help keep the floor litter dry, the drinking trough may be placed in a shelter built out on an outer wall of the house and provided with a slatted or netting floor so that the drips fall outside.

tice of poultry farmers in all districts to feed green food to their laying birds little comment and few complaints were raised of poor yolk colour. Consequently any producer can rectify this undesirable characteristic in eggs from his stock by feeding good green food.

Accepting the fact that many egg producers wish to find an alternative to growing green food today, the Department of Agriculture recommends the use of a good-quality lucerne meal in laying mashes. Until recently it was difficult to buy a lucerne meal which would give satisfactory yolk colour, but this position is gradually changing. There are samples of this meal which when fed at a level of 5 per cent. in the laying mash will colour yolks sufficiently. The Department of Agriculture is not aware of any other material available to the poultry producer at present which will give satisfactory results.

AFTER EGG IS LAID

Management factors, which can affect egg quality where the egg is laid and before it is collected for dispatch to the egg floor, are essentially practical and known to most poultry keepers, but unfortunately are not acted on by all producers.

Three factors can affect adversely the quality of eggs for marketing, assuming that the eggs are perfect when laid. The factors are dirt, temperature, and cracked shells. From the moment it leaves the bird and until it is collected and placed in a receptacle for carrying it an egg is affected by its evnironment, first in the nest box, and secondly and to a less degree by the house in which the nest box is placed.

The Nest Box

Opinions vary as to the best type of nest box and in general it is not possible to indicate a "best" type. Surveys suggest that the community nest box is preferable to individual nests when the maintenance of egg quality is the first consideration; the exception is where trapnesting is practised. The depth of the board at the front of a nest box—single or community—is of considerable importance. Far too many nest boxes have a narrow board at the front instead of one that is at least 6in. deep. The board at the front controls the litter put into the nest and the amount of litter in a nest is an important factor.

Situation of the Nest Box

As heat is a major factor in deterioration of egg quality, nest boxes should not be placed in a part of the house where the direct sun can beat down on them. For this reason nest boxes fitted at the front of a laying house are not desirable, more particularly if they project outside the house and are subject to the full sun at midday. There is also evidence to suggest that the more light there is in a nest box the greater is the risk of cracked eggs. Community nest boxes with an entrance at the back from a dark passage in have much to commend them.

Litter

The quantity, quality, and condition of litter in nest boxes is perhaps the most important factor in respect of dirty eggs and it cannot be emphasised too often that the distributor and public want a clean egg, not a cleaned one.

First, an absorbent litter is highly desirable. Straw is not a good absorbent and consequently shavings or sawdust, or a mixture of both, are preferable. Where a poultry producer prefers a wire floor to the nest boxes in preference to a solid floor sawdust is obviously out of the question.

Secondly, it is most important that there should be a good depth of litter in a nest box, which is possible only where there is a deep front board.

Finally, it greatly reduces the percentage of dirty eggs if the litter is kept clean and dry by changing it at reasonable intervals. The management of nest boxes on these lines is claimed by some to take up too much time, but the time now used in cleaning eggs can be used on cleaning nest boxes. The labour expended will be the same and the improved quality of the eggs will mean fewer down payments at the egg floor.

Dirty eggs, more particularly those soiled by droppings, are always a possible source of trouble after distribution, washed or unwashed. They are usually heavily infected with bacteria which are always present in fowl droppings. Insufficient litter and moist or dirty litter in nest boxes are the cause of many dirty eggs.

Gathering Eggs Frequently

Closely associated with the condition of nest box material is the collecting of eggs frequently. It is claimed that the number of dirty eggs on a farm may be reduced by half where eggs are collected from nest boxes 4 times a day. This will apply in particular during the wetter conditions of winter, but should not be overlooked in summer, when heat is a factor.

Eggs left for long periods in a nest box may be kept at a relatively high and undesirable heat by high atmospheric temperatures in summer, birds sitting on the nest to lay, and birds which are broody and rarely leave the nest.

Such minor points of practical management may well become very weak links in the chain of production and distribution of quality eggs.

Litter in the Laying House

Careless management of litter in the laying house during winter or damp weather can be detrimental to the health of laying stock and be responsible for dirty eggs. In summer anything that can be done to keep the laying house cool and well ventilated will be of benefit to the stock and assist egg quality.

The more important factors which affect egg quality before the egg is laid and before leaving the laying house have been reviewed. Some are more important than others, some are easier of implementation than others, but individually and collectively they have a marked bearing on egg quality.

Farming at Boys' Training Centre, Levin

THE value of farm work for the self-discipline and team-work it requires, for its healthiness, and as a vocational training is fully recognised in the curriculum of the Boys' Training Centre at Levin. The training centre, an institution of the Child Welfare Division of the Department of Education, has a remarkable record of success in straightening out the lives of boys who have broken many of the established rules of social behaviour. Investigations of juvenile delinquency and adult crime shows that a majority of the boys who spend part of their growing-up years at the training centre do not get into trouble afterward.

UNTIL 1939 the Boys' Training Centre occupied a property at Weraroa on the southern outskirts of Levin, but now the training centre is on 160 acres of the former Central Development Farm, the forerunner of Massey Agricultural College. Another 60 acres, 3 miles away, is also farmed by the centre.

The principal feature of the farm is its pedigree Friesian dairy herd. The training centre is recorded in volume 1 of the New Zealand Friesian herd book as owning a bull born in 1904, but the stud really dates from 1932. No outside females have been introduced into the stud since that year. Sales of surplus stock are held every 2 years and attract buyers from all parts of New Zealand and from Australia. The training centre is a successful exhibitor at many of the leading shows in the southern part of the North Island.

Stock

The farm carries 90 to 100 cattle for the greater part of the year. Up to 50 cows are milked in the flush of the season, and 12 to 15 in winter, with an average approximate annual yield of 390lb. of butterfat. The farm supplies all the milk and cream requirements of the training centre and the surplus is separated and sent to the Levin dairy factory.

Though dryness is often a problem in summer and autumn, the growth of pasture, supplemented by hay and silage, swedes, and chou moellier, is sufficient to maintain the herd without using concentrates. An electric fence is used to control grazing throughout winter and spring.

Hay and silage are grown on 50 to 60 acres, and 10 to 12 acres are usually planted in swedes and chou moellier. Three acres of potatoes are grown and a garden covering 3½ acres supplies almost all the centre's vegetables. Buildings, recreation areas, and ornamental gardens cover about 20 acres.

The farm has 300 crossbred breeding ewes, which are mated with Southdown rams for fat lamb production. There are a small piggery and a poultry unit with 100 laying birds. Some of the centre's meat requirements are supplied by culled dairy cows and dry sheep.

The greater part of the farm is on the poorer land of the former Central Development Farm. With a light shingle soil it can best be described as good spring country; the soil's water-retaining properties are not

HEADING PHOTOGRAPH: Part of the pedigree Friesian dairy herd at the centre's farm. Sales of surplus stock at the farm attract buyers from all parts of New Zealand and from Australia.

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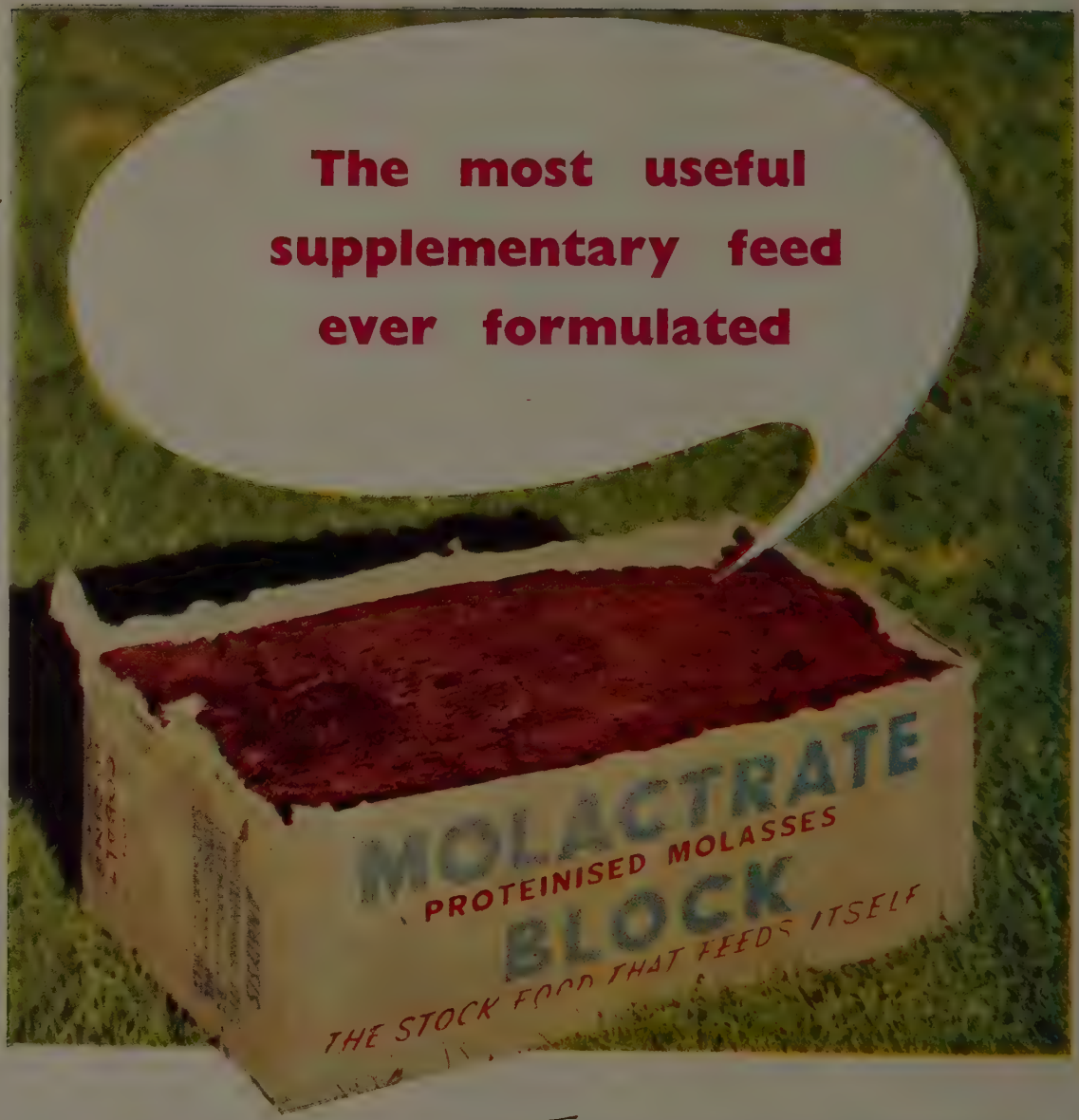

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Mechanical cultivation in the vegetable garden [illegible]

good. Pastures are predominantly ryegrass and clover, but cocksfoot has been found to be valuable under the dry conditions.

Farming Operations

The farm is topdressed annually with 2cwt. of superphosphate per acre, and 5cwt. of lime is applied every 6 to 7 years. Two years ago a soil analysis by the Department of Agriculture showed a deficiency of potash, and this is being corrected with an application of 2cwt. of potassic superphosphate per acre. Land in potatoes is manured with blood and bone, and blood and bone and superphosphate are used for swede and chou moellier crops. In addition $\frac{1}{2}$ ton of lime per acre is applied before swedes are sown.

The centre's farm manager, Mr. D. Standish, has a dairyman, two general assistants, and a gardener to help him, and 10 to 12 of the centre's 53 boys work under their direction in all aspects of farm work. The major shearing is carried out by outside labour, but the boys do all the crutching and the shearing of dry sheep.

Trainees in the carpenters workshop. Much furniture [illegible]

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Boys under 15 years of age are pupils of the Correspondence School and do their school work under the supervision of a housemaster. Older boys are encouraged to continue their studies. This classroom was built by trainees at the centre.

The training centre is an "open" institution. Fences, except to keep in stock on the farm, are conspicuous by their absence, and there are no signboards to announce that it is a place for the re-education of delinquent boys. A casual observer's impression of the training centre is of a place where a great deal of hard work is done—on the farm, in building, the making of furniture, the tending of gardens, and all the other chores in the efficient running of an institution.

Many of the new buildings at the centre have been constructed by the boys to high standards of workmanship under the direction of craftsmen-instructors.

Careful Supervision

There is no regimentation, but in its place there is the most careful supervision and a well thought-out approach to the needs of each boy. The boys quickly learn that if they behave and work well, they will gain privileges—extra pocket money, trips to town, more comfortable living quarters, and so on; if they misbehave, they lose their privileges. The privilege system, the routine of constructive work, co-operation among themselves in living and in recreation, and social service in Levin and its district all help the boys to acquire a proper sense of values and the will to be good citizens.

For the manager of the centre, Mr. E. J. Stanley, and his staff, whether they are housemasters or specialists in the working activities of the centre, day-to-day work involves much more than the actual organisation of the boys' time. Each boy is treated as an individual, perhaps with many problems and misdeeds in common with the others, but nevertheless with problems peculiar to himself. Some will take every chance to improve themselves when given a proper lead; others do not respond so easily, but stand a fair chance of becoming law-abiding and useful citizens. A minority understand only the tougher kind of discipline.

There are few boys at Levin who have had a normal upbringing or a happy home background, and it is often in private talks or in group discussions that the boys realise the reasons for their bad behaviour and begin to unravel their problems.

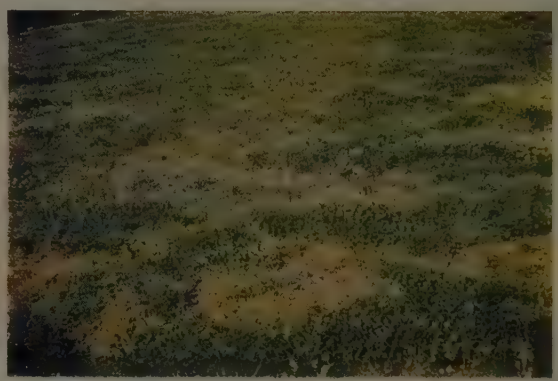
Many boys who have never known wisdom or good advice in their own homes find it at the training centre. Sometimes they need, and get, a straight talking-to or corporal punishment; at all times they have wise guidance from men who know their history and whose job it is to help them. The result of this commonsense approach is that most learn that in living with other people it is better to co-operate than to defy; better to accept responsibility than to shelve it; and better to set about making a career than let the growing-up years be wasted.

The 3½-acre vegetable garden supplies almost all the centre's vegetable needs.

Effects of Rates of Grass Seeding and Phosphate Topdressing on Development of Scrub Land

Portion of the trial area a year after sowing with 30lb. of seed per acre. On the left 5cwt. of superphosphate per acre was sown with the seed. The area at right received no manure.

This area was sown down with 9cwt. of superphosphate and 40lb. of seed per acre. The pasture is 1 year old.



This area was treated the same as that at left, but superphosphate was applied in three dressings each of 3cwt. per acre over the first year.

Year-old pasture sown down with 9cwt. of superphosphate and 40lb. of seed per acre.

Year-old pasture sown down with 9cwt. of superphosphate per acre and 20lb. of seed.

GRASSING SCRUB LAND

IN the development of scrub land in the Auckland land districts a heavy dressing of phosphatic fertiliser is applied to develop high-producing swards of perennial ryegrass and white clover quickly. The usual practice, which was found generally efficacious on the pumice lands in the early 1930s, is to apply 3cwt. of phosphates at time of sowing, 3cwt. 4 to 5 months after sowing, and 3cwt. when the pasture is a year old.

In trial work on the pumice land it was found that with late pastures sown in late spring, dry weather was the limiting factor to growth and it was better to apply phosphates again early in autumn, when growing conditions were good, rather than to make a heavy application at sowing. In the same way growth from autumn sowing was slowed up in cold weather in winter and a spring topdressing was more stimulating to clover than a heavy autumn application.

However, apparently there are soils and conditions where better results can be obtained by heavy initial dressings, and this article describes results of a trial on Waihi ash soil where rates of seeding and rates of fertilisers were investigated.

TRIALS ON WAIHI ASH

IN October 1953 an experiment was laid down on virgin country in the Waihi district. The area, on Waihi ash, was originally covered with manuka from 2ft. to 4ft. high and some bracken fern. This cover was given a double cut with giant discs in August, followed by several heavy harrowings, which finally produced a reasonably well-consolidated seed-bed. The general grass seed mixture sown comprised perennial ryegrass, crested dogstail, cocksfoot, paspalum, white and red clovers, and *Lotus uliginosus* (*major*) at rates of 20lb., 30lb., and 40lb. of the mixture per acre. These plots were crossed with manurial strips on which superphosphate was applied at 3cwt., 6cwt., and 9cwt. per acre respectively. Every year since the whole area has had 3cwt. of superphosphate per acre.

SEEDING AND FERTILISER RATES

The summer after sowing was very dry, as were the spring and early summer of the 1954-55 season. The outstanding feature of the initial establishment was the response to the heaviest rate of topdressing. The plot receiving 9cwt. of superphosphate per acre had plants of grasses and clovers far superior in growth and vigour to those receiving 6cwt. and 3cwt. of superphosphate per acre. In May 1954 the plots sown with 20lb. per acre of seed had 30 to 40 per cent. of bare ground, and those with the 30lb. and 40lb. per acre seeding had only 15 to 20 per cent.

Had the weather during the first year of establishment been satisfactory, the extra ground cover would have justified the sowing of 30lb. rather than 20lb. of seed per acre. As the trial progressed, however, the plot with the 20lb. of seed and 9cwt. of superphosphate thickened up and in October 1955 was as good as the plots which had received a similar dressing of fertiliser but greater quantities of seed.

ASSESSED PRODUCTION OF PASTURE SWARDS

In October 1955, after the trial had been established for 2 years, an endeavour was made to assess the value of the various treatments by estimating the butterfat production per acre that could be expected from each class of pasture. By this time the whole paddock was well established and the sward had shown excellent recovery from the effects of the dry weather.

The plot receiving 3cwt. of superphosphate per acre and 40lb. of seed was weak and open and was estimated to be capable of producing about 90lb. of butterfat per acre. The plot which had 20lb. of seed and 3cwt. of superphosphate per acre was capable of producing about 85lb. of butterfat per acre. On the other hand, the plot which had 20lb. of seed and 9cwt. of superphosphate was dense and vigorous with a sward capable of producing 200lb. of butterfat per acre, and that which had 40lb. of seed and 9cwt. of superphosphate had a comparable class of pasture with the same potential production.

VALUE OF HEAVY PHOSPHATE DRESSING

This trial indicates that when a block of virgin soil low in phosphates is being developed it may be sound practice to sow about 30lb. of grass seed per acre and apply heavy dressings of phosphate, rather than to apply a heavier rate of seeding with a lighter dressing of superphosphate. A further experiment in the same paddock showed that a heavy application of phosphate in the one dressing at time of sowing is preferable to a similar quantity of fertiliser spread over two or three topdressings.

—*A. V. ALLO*

HEADING PHOTOGRAPH: Type of country being developed. The grass is 1 year old and was sown down with 30lb. of seed and 10cwt. of superphosphate per acre.

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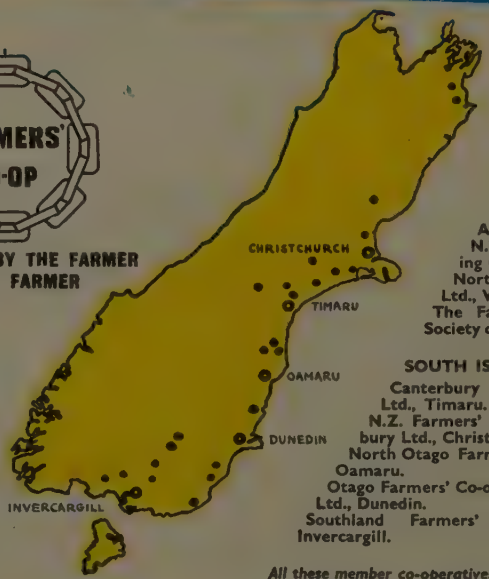

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WORK IN THE HOME GARDEN IN APRIL

FOR most home gardeners April marks the end of the main growing season. Cooler temperatures are the main factor in the decline in plant vigour and growth and because of reduced evaporation or drying out and greater condensation vegetation and generally soil remain moister than in summer; fungous diseases and rotting therefore become more widespread. Usually very little sowing should be done in April. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses some work in the vegetable garden in April.

THE season of good growth for tender and half-hardy crops such as marrows, pumpkins, cucumbers, and tomatoes is finished, though steady growth can be expected from hardy plants such as those of the cabbage family, leeks, silver beet, and spinach. The harvesting and storing of crops such as onions, kumaras, pumpkins, marrows, and squash should be completed before low temperature or frost damage occurs. Low temperatures should be avoided for kumaras if they are to be stored, and frost is likely to damage and affect the keeping quality of plants such as pumpkins, marrows, squash, and even onions.

Asparagus top growth should be cut when the foliage begins to turn yellow, because while the tops are green the plants are building reserves of food in the crowns which will assist in the development of strong spear growth for cutting next spring. If cutting is deferred too long, seed may ripen and fall and the young plants which come up the following season may become established to the detriment of the bed.

Fern growth can be cut with hedge shears which have notched blades or with a sharp knife, and the bed can be weeded afterward if necessary. Top growth is sometimes left to dry and is then burnt on the bed, but it is better to put it on the compost heap.

Few kinds of vegetables should be sown in the open during April, even in favourable districts, though hardy, quick-maturing vegetables like spinach and turnips can be sown in most favourably situated, well-drained soils that are not too cold. Cabbages, cauliflowers, silver beet, and lettuces can be set out in most districts, but seed should be sown only if the soil is well drained and fertile and the aspect and situation are favourable.

Where winters are mild enough for autumn-sown carrots to succeed, a sowing of carrots should be made, preferably early in the month. Seed should be sown as advised in last month's "Journal".

Celery too should be blanched as described in last month's home garden notes and leeks should be earthed up as they develop if long blanched stems are wanted. In some districts a sowing of peas can be made toward the end of the month in well-drained soil and in most districts broad beans can be sown, preferably toward the end of the month, though they are usually best sown in May.

Ground should be cleared and dug over as each crop is finished and refuse put on the compost heap or dug in. If the ground is not wanted for several months, a green crop should be sown. Seed of crops such as lupins or mustard can be sown where temperatures are not too low. Elsewhere crops such as oats or barley can be sown.

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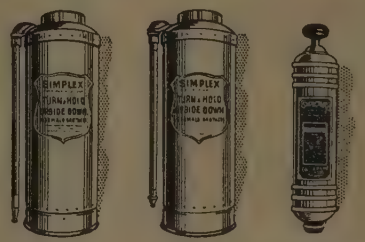

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Spring Cabbage

If early spring cabbage is desired, sturdy, well-grown plants with good root systems can be set out in April, though in most districts planting can be extended over a considerable period from early autumn until mid-winter or even late winter, depending on climate and variety. April is, however, the favoured month in most districts, because if good plants are set out, they usually overwinter well and mature in spring, early or late according to growing conditions.

If they are set out too early, plants may make soft growth and if winter conditions are severe, they may be damaged and their growth checked. If set out very late, they may be late in maturing or if temperatures are low and conditions severe, the crop may fail because of disease or premature seed development. Cabbages planted late in autumn in exposed situations may not mature earlier and may be less satisfactory than plants set out in late winter or early spring.

The soil for spring cabbage should be rich in organic matter and in most home garden soils a dressing of organic manure such as farmyard manure, stable manure, or compost or a moderate dressing of fowl manure is likely to give best results. If the soil has not been limed recently and there is a risk of its being acid, a dressing of 3oz. to 4oz. of carbonate of lime per square yard is advisable. Heavier dressings may be necessary on some soils in high-rainfall districts.

As the effectiveness of lime is in direct relation to the closeness of its contact to the soil particles, it is best applied some time before planting. Distribution and incorporation by forking over should be as even as possible. Thoroughness of distribution is important, because there is little or no sideways spread of lime in the soil after it is applied, though its downward spread is assured by the leaching action of rain-water.

Though the manurial needs of cabbages are heavy, care should be taken to distribute fertilisers or manures evenly, as young plants may be checked if the roots come in contact with too heavy concentrations of manure, particularly at a time when low temperatures limit growth. Where organic manures are not available a green crop should be dug in and except where the soil is very rich the organic manure or green crop should be supplemented by a complete fertiliser at about 2oz. to 5oz. per square yard.

In addition side dressings of nitrogenous manures such as nitrate of soda or sulphate of ammonia are often advisable, particularly where organic matter applied to the soil is strawy rather than sappy and well rotted and when quick, forced growth is required (as when temperatures rise in early spring).

Asparagus tops should be cut when they begin to lose their healthy green colour.

Spring Cauliflower

The requirements of cauliflowers are similar to those of cabbage except that cauliflowers are more sensitive to adverse conditions such as extremes of heat and cold, wetness and dryness, or cold winds, and if checked, they are likely to "button"; that is, form only useless miniature heads. Frosts, too, will damage the curds, and the injury so caused is likely to permit the entry of soft-rotting organisms. Cauliflowers should therefore be planted out only in districts or situations where winters are not too severe.

In unfavourable situations planting is best deferred until late July, August, or even September. Good hardy varieties of cauliflower suitable for planting now are Walcheren, All Seasons (All Year Round), and Early London Cauliflower plants are obtainable from most seedsmen.

Sweet Potatoes or Kumaras

Home gardeners who grow sweet potatoes usually leave the main crop to develop as long as possible, because sweet potatoes gain rapidly in total yield and the table quality of mature tubers is better than that of immature ones, but where tubers are to be stored, digging should be completed before there is risk of low temperature injury. Even if it is not intended to store tubers and an unusually early frost kills the tops, it is advisable to remove them promptly, as rots develop in the foliage and sometimes penetrate to the tubers.

When sweet potatoes are mature enough for storage the skins should be reasonably firm. They can be tested by cutting; when they are cut mature tubers dry rapidly and cleanly on exposure to the air.

Most varieties of sweet potatoes are likely to be injured when the temperature falls to 40 degrees F. (8 degrees above freezing point) and the keeping quality is so seriously affected that long storage is usually impossible. For best results the tubers should not be subjected to temperatures below 50 degrees F.

If sweet potatoes are carefully harvested and properly cured and stored, it should be possible to keep them until next season's crop is ready, but if digging is delayed until after frosts and tubers are left for several days in wet,

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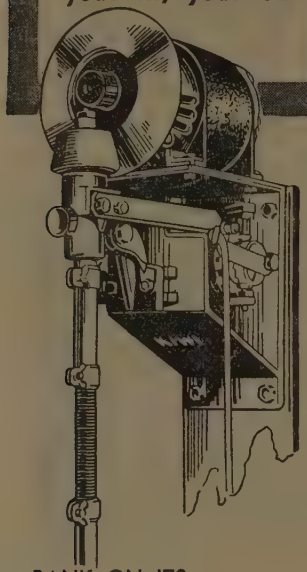

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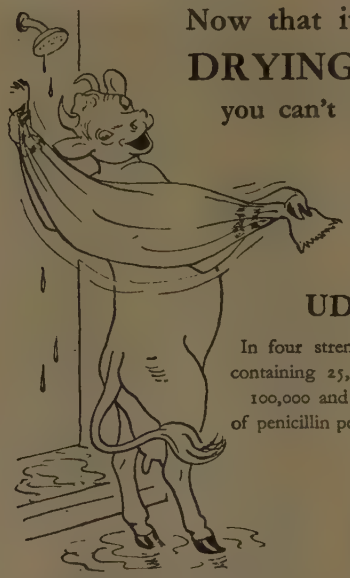

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cold soil, loss during storage may ultimately be very high. Even a few days at 40 degrees F. may cause discoloration, and if the tubers are set to grow shoots for cuttings, poor sprouting is likely to result.

To ensure that their quality remains at its best from one harvest to another tubers should be handled with care. Badly damaged ones should be rejected and the remainder subjected to a period of fairly high temperature and humidity to cure them and enable wounds to heal. They should then be stored in most hygienic conditions at a temperature of not less than 50 degrees F.

Where small quantities are being stored a reasonably warm shed or cellar is usually suitable if the tubers are placed in dry sawdust or dry sand. Deep placement in dry sand will prevent rats from getting to them.

Where large quantities are stored a pit or bank similar to that used for potatoes is occasionally used, though it is not generally recommended. However, a pit may be satisfactory if it is well made and insulated against cold and wet and if there is room for a person to move about in it. It should be clean and vermin-proof, as rats and mice not only eat the tubers but spread diseases that cause rotting.

Correct harvesting and curing of the bulbs is as important as proper storage in the keeping of onions.

Lined storage places, bins, and containers that are used year after year should be sprayed with a suitable fungicide before being used. Copper sulphate (½lb. to about 12 gallons of water) makes a suitable spray.

Curing of Tubers

Proper curing is as necessary as care in lifting and handling. In New Zealand curing of a kind is usually done by gathering the tubers into heaps and leaving them for about a week and keeping them covered during rain or at night with their vines or old sacks. Where temperatures are sufficiently high quite fair results are usually obtained from this method. By the time the tubers are ready for storage damaged ones which may have been overlooked have begun to decay and can be rejected.

If tubers are to be properly cured in the field, they should be subjected to temperatures of not less than 70 degrees F. and fairly high relative humidity day and night for as long as 3 to 4 weeks or more. Such long curing is not usually a practical proposition in New Zealand, however, because of the need to grow the plants for as long as possible. Curing for too long may result in excessive sprouting.

It is rarely possible for the home gardener to cure his sweet potatoes under ideal conditions. It is difficult even for the commercial grower unless large quantities are grown and stored, as a strict routine must be followed.

Cabbage for spring use can be set out in most districts in April, but for the best results only good plants should be chosen.

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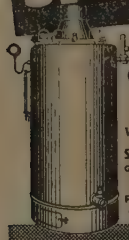

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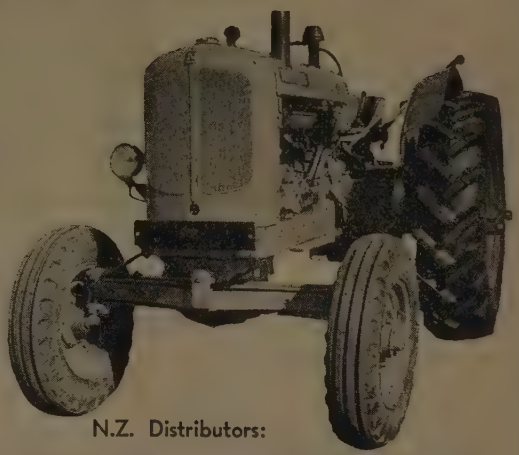

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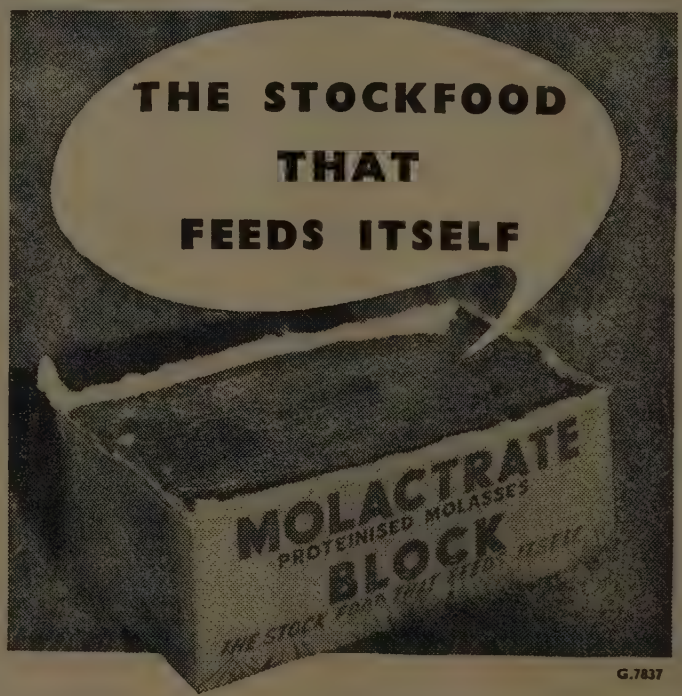

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Onions

Harvesting and curing of onions for long keeping should be completed as soon as possible, as the weather after April becomes progressively less favourable for drying bulbs and proper drying and curing are essential for long keeping. Only sound, well-formed bulbs which have been properly cured should go into long storage; others should be put aside for immediate use. Small quantities can be strung or stored in open mesh bags in a cool ventilated shed or cellar, but because of the injury which often results when there is a heavy weight of onions in a bag, it is advisable when storing considerable quantities of onions to use specially made slatted storage crates or to store them on slatted shelves.

Onions should not be exposed to direct sunlight during storage, as it may promote early growth; nor should they be exposed to excessively moist conditions, as it may encourage the development of roots, which are exhausting to the bulbs. If it is necessary to store them outside, a dry, sunless position, where there is good air draught is desirable. In favourable sunny situations the onions can be hung on a frame as illustrated in last month's notes, but they should be covered against rain, and air should circulate freely around them.

When onion plants ripen properly the leaves weaken in the neck or region just above the bulb and the top falls over and the leaves remain green. If the top dries from the tips toward the base while the plant stands erect, the neck is not closed and the bulbs may not keep well in storage.

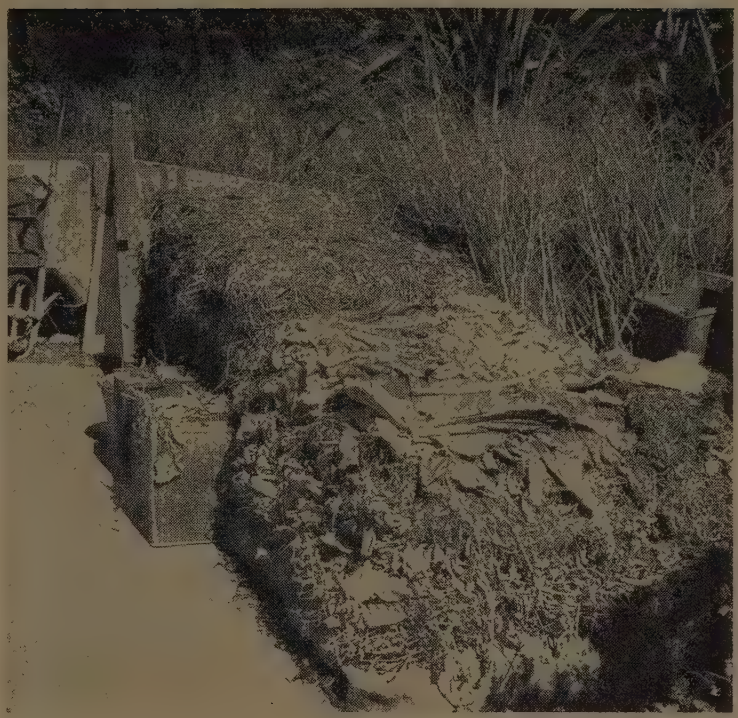
Unfortunately onions in a crop rarely mature uniformly and the best time to begin to harvest them is when about 20 to 25 per cent. of the tops have broken over. If onions are completely ripe when they are harvested they tend to root rather easily if left lying on moist ground and this sort of growth is difficult to check and usually makes them unfit for anything but immediate use. If onions are pulled when they are slightly immature, they tend to retain their outer skins better and are less likely to sprout and root than if they are cured in the field.

Immature onions are, however, often less solid than fully mature onions and the stage at which onions are harvested must usually be largely governed by climatic conditions, drying and storage facilities, and whether they are for long keeping or more immediate use.

Not all onion varieties are suitable for storing. In New Zealand the most generally preferred variety is Pukekohe Long Keeper.

Autumn-sown Onions

Though autumn sowing of main crop onions is a fairly general practice in the North Island, it is rarely done in southern districts. In most districts late March or early April is considered the best time for autumn sowing. In southern districts the onions are not usually thinned, but are kept cultivated and grown on until about November or December, when they are used as "thick necks" without being encouraged to form large bulbs. In most northern districts, however, the plants are lifted in early spring and set out in rows 12in. to 15in. apart, with the plants 4in. to 6in. apart in the rows.



Autumn is a good time to build a compost heap, as crop residues are usually plentiful then.

Autumn sowing in some districts is rather risky, and where winters are severe success depends to some extent on the season. Early frost will sometimes "lift" and damage late-sown crops, whereas if the seed is sown too early or if a long period of mild weather precedes a very severe cold period, the plants sometimes run to seed before they have developed adequately.

Though this is true of autumn sowing in general, in the north, where winters are less severe and mildew is more troublesome on the later crops, the risks are much less and autumn sowing and transplanting of the main crop in July or August are quite common. For autumn sowing the ground should be deeply cultivated and broken down to a fine tilth. It should be gently firmed, but care should be taken where the soil is heavy to avoid firming it too much, as the heavier soils tend to consolidate excessively where they are subjected to frequent winter rains.

If well-rotted stable or farmyard manure is available, it should be incorporated some time before the final preparation of the soil is begun. Best use can be made of such manure by adding it to land on which the crop is to mature. If keeping quality onions are required, it is not advisable to apply excessive quantities of organic manure in spring, as the bulbs may be stimulated into excessive leaf growth and weed growth is likely to be more troublesome.

Few home gardeners are likely to have much farmyard manure, and available organic matter such as compost plus a complete fertiliser applied at the rate of about 3oz. to 6oz. per

square yard should be used. Because of the great variation in soils and their condition throughout New Zealand only local experience and knowledge can indicate fertiliser requirements, but if soil conditions and fertiliser placement are correct, it seems unlikely, judging by experiments that have been carried out, that onions will be over-fertilised.

In general a fertiliser high in phosphoric acid but containing a liberal amount of potash and a smaller amount of slowly available nitrogen will give excellent results. The phosphoric acid and most of the nitrogen for early planted crops can be supplied conveniently by finely ground bone meal and the potash can be supplied by muriate or sulphate of potash.

The practice of growing onions on the same land for several years in succession has not much to commend it. It probably arose from a recognition of the high fertiliser needs of the onion and consequently the desirability of maintaining an area of the garden in very high fertility and regarding it as the onion bed. However, rotation is just as important in growing onions as in growing other crops, as diseases to which the crop is especially subject tend to build up in soil unless crops are rotated. In addition most other vegetables grow well without further fertiliser on land that has received the heavy fertiliser applications usually given to onions.

Onion seed should be sown ½in. deep at the rate of 10 to 20 seed per running foot in rows 12in. apart in finely cultivated soil.

The growth of onions, unlike that of most other crops, is not usually seriously affected by moderate crowding in the rows, and provided the seed is not sown too thickly, thinning should not be necessary on most soils. Good varieties of onions include Ailsa Craig, Straw Spanish (early), and Pukekohe Long Keeper (main crop or long keeping).

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during April as follows:—

1YA Auckland, 7.45 p.m.

3 April—"Autumn Pasture Management", by M. N. Walbran, Fields Instructor, Department of Agriculture, Pukekohe.

10 and 24 April—Talks by officers of Animal Industry Division, Department of Agriculture, Auckland.

17 April—"Maintenance of Air Strips", by E. H. Arnold, Assistant Fields Superintendent, Department of Agriculture, Auckland.

1XH Hamilton, 12.33 p.m.

8 April—"Efficient Use of Brooders", by W. L. Jourdain, Poultry Instructor, Department of Agriculture, Hamilton.

15 April—"Topdressing Trials at Rukuhia Soil Research Station", by I. L. Elliott, Assistant Superintendent, Department of Agriculture's Soil Research Station, Rukuhia.

29 April—"Improvements to the Milking Shed", by L. E. Downs, Special Inspector, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

3 April—"Preparing Hives for Winter", by D. A. Briscoe, Apiary Instructor, Department of Agriculture, Tauranga.

17 April—"Management of Breeding Ewes", by M. B. Mackenzie, Livestock Instructor, Department of Agriculture, Tauranga.

2XA Wanganui, 8 p.m.

4 April—"For the Country Woman", by Mary MacDonald.

11 April—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

18 April—"Different Poultry Breeding Plans", by B. J. Russell, Poultry Instructor, Department of Agriculture, Wanganui.

25 April—"Some Common Grasses: Their Value and Management", by A. K. Booth, Instructor in Agriculture, Department of Agriculture, Wanganui.

2YZ Napier, 7.10 p.m.

9 April—"Planting for Soil Conservation", by J. L. Porter, Soil Conservator, Department of Agriculture, Hamilton.

23 April—"Practical Hints to Poultry Farmers", by H. K. Mullins, Poultry Instructor, Department of Agriculture, Hamilton.

2ZA Palmerston North, 12.33 p.m.

1 April—"Some Causes of Wastage in the Pig Industry", by R. G. Gill, Livestock Instructor, Department of Agriculture, Levin.

8 April—"Wintering Cattle on Topdressed Hill Country", by F. G. Spite, Instructor in Agriculture, Department of Agriculture, Masterton.

15 April—"Grass-grub on Small Fruit Areas", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

22 April—"The Purpose of Field Drainage", by K. L. Mayo, Instructor in Agriculture (Farm Drainage), Department of Agriculture, Palmerston North.

29 April—"Milking Machine Efficiency", by H. A. Du Fresne, Farm Dairy Instructor, Department of Agriculture, Palmerston North.

3YA Christchurch, 12.20 p.m.

1 April—"General Hygiene in Tomato Glasshouses", by L. C. Hurndell, Horticultural Instructor, Department of Agriculture, Christchurch.

15 April—"Review of 'The New Zealand Journal of Agriculture' ", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

1 April—"Harvesting the Potato Crop", by S. M. J. Stockdill, Fields Instructor, Department of Agriculture, Dunedin.

8 April—"Seasonal Sheep Breeding Problems", by I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin.

15 April—"Plant Quarantine", by I. Harris, Plant Quarantine Officer, Department of Agriculture, Dunedin.

29 April—"Hormone Weed Control", by R. C. Schofield, Instructor in Agriculture, Department of Agriculture, Alexandra.

4YZ Invercargill (to follow joint talk from 4YA and 4YZ)

1 April—"Autumn-saved Grass", by T. Sewell, Instructor in Agriculture, Department of Agriculture, Gore.

8 April—"Use of Vaccines", by R. Buchan, Livestock Instructor, Department of Agriculture, Gore.

15 April—"Seed Production", by T. L. Reid, Fields Instructor, Department of Agriculture, Gore.

29 April—"Soil Conservation", by W. O. Sly, Soil Conservator, Department of Agriculture, Invercargill.

Regular Sessions

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7 p.m. (Bay of Plenty Country Journal; Pig Council talk on the fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m. (News for the farmer).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Tuesdays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Sheep Dog Trials

ADVICE of the venue and starting date of the North Island and New Zealand Sheep Dog Trial Championships in 1957 has been received from Mr. R. Fox-Rogers, secretary-treasurer of the North Island Sheep Dog Trial Association (Inc.), 8 Ellison Road, Havelock North (tel. 2301, Hastings). They are:—

North Island and New Zealand Championships: Beginning 10 June, conducted by Wanganui Centre at Mangamahu.

The South Island Championships will begin on 24 June at Kyeburn.

Control of Diseases in Household Poultry Flocks

By M. E. WHITE,
Poultry Instructor, Department of Agriculture, Levin

DISEASE in the household poultry flock can seriously affect production and so affect the source of supply of eggs for at least a part of the year to a large number of families. Just as important as the drop in egg production is the resultant and sometimes far-reaching effect such losses have on the poultry keeper himself. Quite often a novice's enthusiasm is killed at an early stage by poor results and high cost of obtaining a few eggs. All too soon he loses interest, finds he can buy his eggs more cheaply at the local dairy, and very quickly turns his back, and his axe, on his fowls. In an earlier article several of the more common diseases of poultry and their remedies were described. This article discusses four conditions which also occur fairly frequently in small flocks. Some of these troubles respond to individual treatment which may save the affected birds.

Feather Picking and Cannibalism

THE term cannibalism is usually restricted to cases where birds attack other birds in the pen and cause bleeding wounds. Both feather picking and cannibalism are regarded as vices which may arise from a number of causes, including overcrowding, idleness or boredom, dirty conditions, or the irritation caused by external parasites. Often one bird in the pen will start off an outbreak of these troubles.

Control

In a small flock the offending bird can often be identified at an early stage and the disposal of this bird will stop further trouble. A check on the diet should be made to ensure that the flock is being correctly fed, but usually a food deficiency is not the primary cause of feather picking or cannibalism. Measures which are usually adopted to control these vices are:—

1. Hanging silver beet or other greenfeed from the roof to allow the birds to pick at it. This reduces idleness.

2. Adding whole oats to the grain ration: At least part of the grain feed should be fed in the litters to keep birds occupied.

3. Increasing the salt content of the mash for 2 or 3 days. On a mash-grain ration 4 per cent. of salt may be added to the mash.

If these measures are not successful, it may be necessary to trim the upper beak with a sharp knife, removing about 3/16in. from the tip. The bird is then less able to peck at other fowls.

All wounds caused by pecking should be dressed as soon as possible with a dark ointment or Stockholm tar, since other birds are attracted by the redness of the wound.

Vitamin A Deficiency

If the household flock is fed on the standard type of laying mash with grain on the lines recommended in previous articles, it is highly improbable that any deficiency of minerals or vitamins will occur. Special attention should be paid to the importance of vitamin A to the laying birds.

Most owners of small flocks are aware of the necessity for greenfeed, but at certain periods of the year this may be of poor quality and fail to satisfy the need for vitamin A.

Deficiency of vitamin A leads to poor egg production, lack of resistance to disease, and, if severe enough, symptoms similar to a cold—that is, swelling of the sinuses and a discharge from the eyes and nose. This is usually known as nutritional roup.

Where there is difficulty in supplying adequate greenfeed of good quality a fish oil containing vitamin A should be added to the mash. Many people consider it advisable to use the fish oil during the whole season as an added safeguard. Three tablespoons of a feeding oil should be well mixed into 10lb. of mash.

The inclusion of this fish oil in the diet ensures that the vitamin D requirements are fully met. Vitamin D is required by young pullets and laying birds to ensure proper assimilation of calcium, which they require for bone building and the formation of egg shells. Normally exposure to sunlight for a few hours daily is sufficient to enable the birds to synthesise their own requirements of this vitamin, but if they are kept intensively with no access to sunshine, vitamin D must be supplied in the feed.

Impacted Crop (Crop Bound)

Impaction of the crop usually arises from the matting together of fibrous material such as coarse grass or straw which eventually prevents food from passing on from the crop to the stomach. Paralysis of the crop wall may also result from a disease such as fowl paralysis.

The distended crop is observed as a large firmly packed swelling at the lower end of the neck.

A bird showing the typical appearance caused by lack of vitamin A in the diet. The inflamed, swollen eyes, shrunken comb, and unthrifty appearance are symptoms of the deficiency.

Treatment

If the condition is not too far advanced, the administering of 2 teaspoons of olive oil or liquid paraffin, followed by massage of the crop area toward the head, may relieve the condition sufficiently to allow recovery. This process is greatly assisted by holding the bird upside down.

Operation on the crop can be successfully done if the first method is useless. The skin over the crop is incised with a sharp razor blade or knife after the feathers have been removed from the area. The skin incision should then be pulled to one side to cut the crop so that the second incision is not immediately under the first. The impacted contents may then be removed with a small spoon or forceps. The crop should then be washed out with boiled water to which common salt in the proportion of 1 teaspoon to a pint has been added and allowed to cool; alternatively a weak solution of a non-irritating antiseptic may be used.

The opening need not be more than 1in. long and the two incisions should be stitched up separately. Three or four stitches of silk or cotton thread are used to close the crop and the same number are used for the skin wound.

A soft wet mash should be fed for a few days.

Sour Crop

Sour crop is somewht similar to impacted crop, but the contents are more fluid, and therefore easily emptied out by upending the bird and massaging the crop. The bird should be given an occasional rest during the process. Emptying of the crop may be followed by dosing the bird with ½ teaspoon of baking soda in warm water. The feed should consist of grains only for 2 or 3 days after treatment.

Infectious Coryza (Roup or Colds)

The general term roup is often used by poultry keepers to indicate a purulent discharge at a bird's eyes and nostrils which is usually accompanied by swellings on the face. However, this condition may be caused by several diseases—for example, fowl pox and vitamin A deficiency—and is therefore a vague term which merely describes an obvious symptom common to a number of diseases.

Mild outbreaks of colds giving rise to a slight nasal discharge are fairly common in poultry flocks. The condition is frequently accompanied by gulping or sniffing sounds which are more easily noticed when the birds are perching. Sometimes only one or two birds are affected and the condition does not appear to spread very rapidly to others.

Infectious colds or coryza spread rapidly among birds and may cause several deaths, severe and general loss of condition, and a drop in egg production. Where this trouble is suspected the householder should seek advice regarding treatment from a Poultry Instructor of the Department of Agriculture.

Control

These conditions are more prevalent during damp, cold weather, especially in autumn and early winter. Dampness, overcrowding, poor ventilation, lack of vitamin A, and worm infestation are factors which are commonly associated with the development of the common cold in poultry.

Immediately a bird shows signs of a discharge accompanied by sneezing or coughing it should be isolated if possible and a close watch kept on the remaining birds.

The household poultry keeper will generally obtain good results by isolating affected birds and providing comfortable, warm but well-ventilated quarters free from draughts. Wet mash is more suitable for sick birds, and an ample supply of good green-feed should be provided. The use of antiseptics in the drinking water is of little value and renewing the supply of fresh water will give better results.

Local treatment of the symptoms is useful, but care must be taken to avoid spreading the disease after handling of sick birds. Cleaning the eyes and nostrils with a solution of boric acid, hydrogen peroxide, or other mild antiseptic helps to relieve the affected bird. Eucalyptus oil or menthol and turpentine sprayed in the house at night or the application of a menthol ointment to the nostrils is also useful. If a fish-liver oil is not being fed, it should be added to the diet in the amount recommended by the manufacturer.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during December 1956 and for the 5 months ended 31 December 1956 with comparative figures for the same month and 5 months of 1955 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
December 1956	23,144	391	23,535	—
December 1955	23,900	395	24,295	—
Increase or decrease	—756	—4	—760	—3.128
5 months ended 31/12/56	95,905	1,576	97,481	—
5 months ended 31/12/55	97,683	1,625	99,308	—
Increase or decrease	—1,778	—49	—1,827	—1.840

Butter in store at 31 December 1956 was 20,314 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
December 1956	11,254	1,912	13,166	—
December 1955	11,745	2,318	14,063	—
Increase or decrease	—491	—406	—897	—6.378
5 months ended 31/12/56	40,987	5,924	46,911	—
5 months ended 31/12/55	41,735	6,449	48,184	—
Increase or decrease	—748	—525	—1,273	—2.642

Cheese in store at 31 December 1956 was 22,400 tons

If these figures are converted into butterfat equivalent, there is a decrease of 1.984 per cent. in butterfat graded for the 5 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Aldrin and Dieldrin Dips

IN an article "Control of Sheep Lice, Keds, and Fly Strike" in the December issue of the "Journal" reference was made to an article in the October 1955 issue of the "Australian Veterinary Journal" by J. H. Riches and P. J. O'Sullivan describing trials in the jetting of sheep with dieldrin and aldrin as a protection against fly strike. In the incorporation of part of the Australian results in the "Journal" article, conclusions were drawn that were not those drawn by the original authors from the whole of their work, and apology is made to them and to the "Australian Veterinary Journal". In discussing their experiments the Australian workers stated ". . . under the conditions of assessment, based on larval implants, dieldrin and aldrin were approximately equal at all concentrations . . . ."

The use of dipping preparations containing either aldrin or dieldrin that have been approved by the Stock Remedies Board is recommended by the Department, as was stated in the "Journal" article.

There are some brands of dips containing dieldrin or aldrin that should be mixed at rates other than that stated in the "Journal" article. In the mixing of all dips the makers' specifications on the packet should always be followed.

Selection of Grape Varieties

THE choice of good grape varieties is the basic requirement for quality in the wine industry and in table grape growing. Experimental work at the Department of Agriculture's Te Kauwhata Horticultural Research Station includes the selection of good grape varieties suitable for New Zealand conditions, and in this article D. S. Kasza, Viticulturist at the Station, reports the results to date and discusses the need for high quality in wine and table grapes.

DURING the Second World War and in the first few post-war years imports of wines and spirits were curtailed, and to supply the demand local vineyards increased their production. As the demand then was rather for quantity than for quality, the grape varieties planted were mainly the Franco-American *(Vitis vinifera* x *Vitis labrusca)* hybrids, for example, the red Seibel 4643, S.5163, S.5437, S.5455, and Baco 1, and the white Baco 22-A, Seibel 5409, and Gaillard Girerd 157. Albany Surprise also has been grown for wine production.

Most of these grape varieties possess some resistance to fungous diseases, an important point during the war when spraying had to be reduced to a minimum because of the shortage of labour, fungicides, machinery, and petrol. Another factor in their favour, mainly in Auckland Province, was that some of these varieties when grown on their own roots also withstood the attack of phylloxera, and consequently propagation was quicker and less costly.

Effect of Wine Importations

With the return to normal conditions, however, overseas wines again appeared on the market. Most of the local product was fortified, sweet (dessert) wines—a field in which New Zealand wine merchants can never successfully compete with the makers of the luscious, full-bodied wines of the Mediterranean countries or of Australia and South Africa. Thus, the sale of New Zealand wines has become increasingly difficult.

Climatic Factors

Recent research work has confirmed what earlier workers in this field (Bragato, Anderson, Woodfin, and Berry-Smith) indicated, that the climate of New Zealand favours the production of table wines of low alcoholic strength. Natural sweet wines of higher strength cannot be made here, because there is no long dry autumn when the grapes can sweeten on the vines without deterioration until partially dried.

Meteorological records taken at Te Kauwhata in 1955 show 2085 hours of bright sunshine and 37.4in. of rain for the year; the effective heat summation, calculated with the method of Jacob and Winkler, gives the figure of 2807.3 (To produce natural sweet wines at least 2800 hours of bright sunshine and an effective heat summation of about 3800 would be desirable.) Though 1955 was considered a dry and warm year, none of the grape sorts suitable for dessert wines reached full maturity. It is evident that only those varieties which will ripen early in the season, that is, before 15 March, can be depended on to mature their crops fully. Such grapes will make good table wines, comparable in quality with imported wines of good commercial standard, but are less suitable for fortified, dessert wines.

It may never be possible to produce in New Zealand wines equal to a Château Mouton Rotschild, a Château d'Yquem, or to a fine dry Moselle Riesling. Such wines are the perfect result of the combination of optimum soil and climate and the finest grape sorts known. They are made in very small quantities only and are sold at very high prices (£3 to £8 a bottle). It is possible, however, to produce wines here of very good quality, if the right grape sorts are chosen. Only the *Vitis vinifera* varieties possess the characteristics necessary for making fine wines. Though a few hybrids of good quality have been released lately in France and in the United States, some are unlikely to ripen early enough to be useful in the temperate climate of New Zealand.

The susceptibility of *Vinifera* grapes to fungous diseases is a less serious disadvantage than it was some years ago. With better spraying materials and improved spraying machines and techniques the high-quality but disease-susceptible *Vinifera* grapes can now be safely planted, provided they are regularly sprayed.

The resistance of *Vinifera* x *Labrusca* hybrid vines to phylloxera is doubtful. In heavy clay soils the insect will damage some of them nearly as badly as it damages the *Vinifera* grapes. On the other hand, the higher quality of the *Viniferas*, when good wines are made, will eventually offset the additional cost of grafted vines.

Since 1951 a good number of grape sorts has been kept under observation at Te Kauwhata Horticultural Research Station. The work has included research on soil, rootstock, and manure requirements, disease susceptibility, resistance or response to spraying, vigour, cropping ability, and quality for wine-making or table purposes. During the ripening period weekly sugar and acidity tests have been taken. All these data contributed toward the selection of grape varieties which could be grown in most parts of New Zealand.

Some of the grapes included in the tests are well-known and proved old varieties which gave excellent results in the early days of New Zealand viticulture. More varieties will be added later, when 14 early maturing sorts imported in 1953 from the Stellenbosch Viticultural Research Station in South Africa come into regular bearing.

Following are observations on some of the better varieties showing promise under Te Kauwhata climatic and soil conditions.

The accompanying graphs, showing the optimum maturity of 6 individual varieties, were drawn from information obtained during the seasons indicated. The maturity index was obtained by dividing the sugar content by the total acidity. The highest point on each curve in the graphs shows the date on which the particular grape variety reached its optimum maturity.

White Wine Grapes

Among the white grapes **Riesling Sylvaner** has given very good results at Te Kauwhata. It is a cross between the Riesling and the Green Sylvaner obtained by Mueller-Thurgau in the early years of this century in Switzerland. It inherited the fine aroma of its Riesling parent, and the Sylvaner gave it the regular cropping ability. When grafted on Mourvèdre x Rupestris 1202 rootstock and trained on the double Guyot system (horizontal long canes with about 10 to 12 buds each and two-eyed spurs for cane replacement) it yields regularly good crops of about 2.5 to 3 tons per acre. It is moderately susceptible to downy mildew *(Plasmopara viticola)* and to black spot *(Elsinoe ampelina* or *Gloeosporium ampelophagum)*, and less so to powdery mildew *(Oidium tuckeri)*. Regular sprays will protect it from these diseases.

The Riesling Sylvaner matures in early March (Fig. 1), reaching over 11 Degrees Beaumé sugar content while its total acidity drops to 6 to 7 grammes per litre (expressed in tartaric acid). It is recommended for a good table wine, ready for consumption in 8 to 9 months.

Pinot Chardonnay is one of the finest white grapes in the world, giving the famous chablis wine of France. It is also used in making champagne. In New Zealand the 1202 stock gives it medium vigour, producing regular crops of about 2 to 2.5 tons per acre. It should be long pruned, but if more than 26 to 28 buds are left, it may produce a heavy crop of grapes

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5. HOLDING THE SOIL

One of the important aims of forestry is the prevention of erosion. Forests like those clothing Mt. Egmont protect the dairying lands below. New Zealand is a mountainous country and the forests, scrub, tussock and other vegetation literally hold the steep country together. Forests on upland country and at the source of rivers act as natural reservoirs, prevent water run-off and flooding, store rainfall for the generation of electricity and provide a regular flow of clear water for town supply. Forests minimise the flooding of rivers with all its destructive consequences — the washing away of the soil, loss of life and disruption of communications. The New Zealand Forest Service works in close co-operation with the Soil Conservation Council for the prevention of erosion and the economical recovery of land.

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which fail to mature. The only disease to which it is very susceptible is downy mildew. Oidium and black spot will attack it only in very warm, humid weather. Though it ripens toward the middle of March (Fig. 2), it is well worth growing, as it produces one of the finest dry wines that can be made here.

Golden Chasselas: The best representative of the Chasselas group is Salomon's selection of the Chasselas doré. In New Zealand it is a valuable dual-purpose grape, as besides being a good wine grape in the temperate climate, it is the classical table grape all over the world. In Britain it is known as the Royal Muscadine, in Germany and Austria as the Gutedel, and in Switzerland it is called the Fendant and is the main grape variety. There it is used not only as a table and a wine grape, but it is also the mainstay of the very highly developed Swiss grape juice industry.

The Golden Chasselas grows well in most grape-growing districts of New Zealand. Best results can be obtained if it is grafted on 1202 rootstock. It can be grown on spurs or on long canes. At Te Kauwhata no more than 35 to 40 buds are left when it is pruned. If more wood was left, the result would be a heavy but poorly matured crop. The Chasselas has to be sprayed against downy mildew, and in humid and dull conditions it should also be protected against black spot and oidium. However, it amply rewards the work spent on it, for it ripens fairly early (Fig. 3), and if protected from birds, the grapes will keep on the vines for a long time—up to 4 weeks. Its wine is light and soft and blends well with varieties of strong flavour.

Fig. 2— Chardonnay

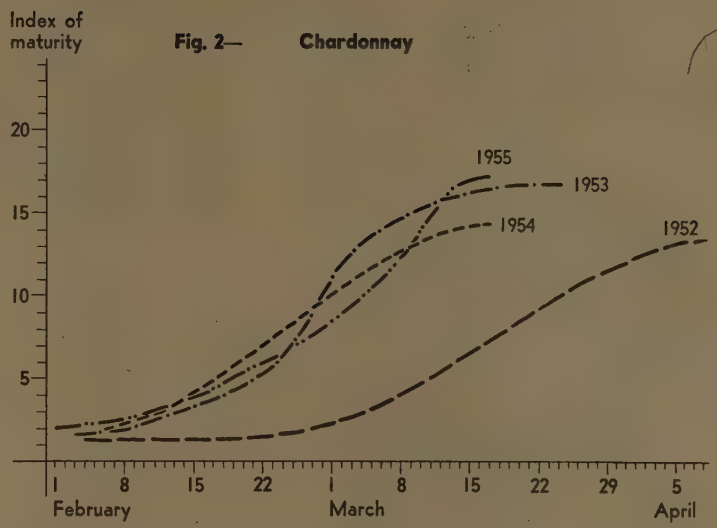
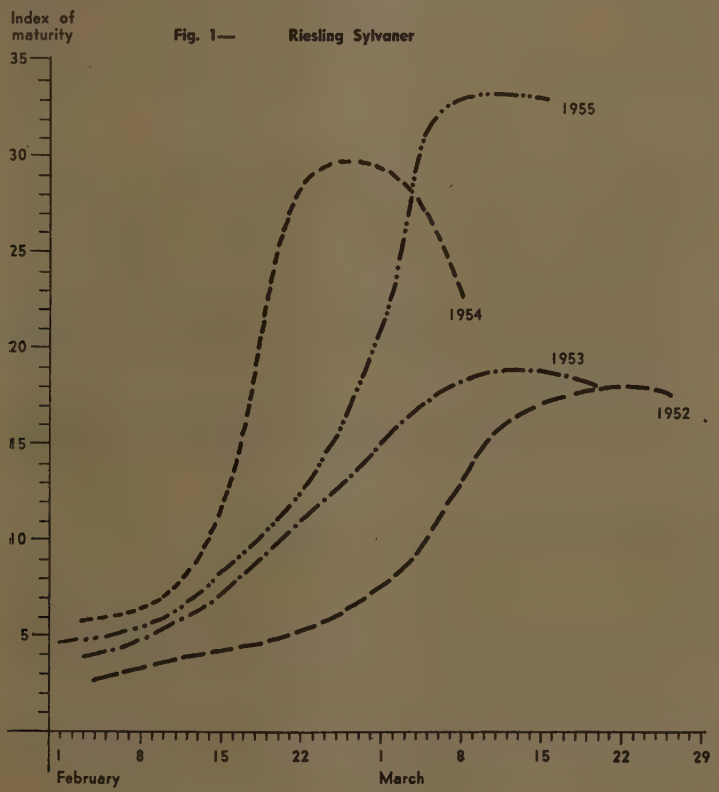


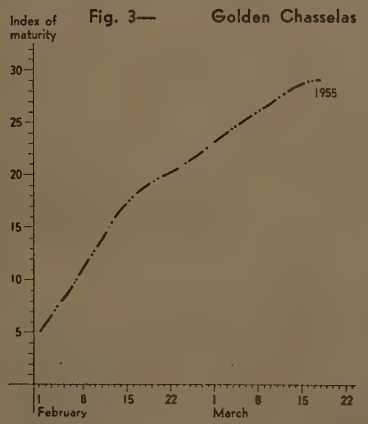
Fig. 1— Riesling Sylvaner



The Chasselas has many sub-varieties which differ from the basic type in the sinuses, dentition, and colour of the leaf. An interesting type for home gardens is the Parsley-leafed Chasselas, with decorative foliage. In table vineyards the Ruby Chasselas or Chasselas rose royale is also planted. Its brilliant ruby colour gives variety and eye appeal to the grapes.

Palomino is another dual-purpose grape. In spite of its name, it is not identical with the true Spanish Palomino, which, according to Viala and

Fig. 3— Golden Chasselas



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Vermorel, is a bluish-purple grape. The grape cultivated in New Zealand is one of the Sweetwater types called Palomino, of Australian origin, though it closely resembles the Lignan blanc.

The Palomino grows well on 1202 and on Riparia x Berlandieri 420-A stocks, but it requires well-drained soil. Being rather susceptible to black spot, it needs regular spraying. It ripens in mid-March (Fig. 4), when its large bunches of golden-amber grapes present a beautiful sight. Having a large and moderately loose bunch, good appearance, and interesting flavour, it is a good table grape, but it merits attention as a wine grape too, as experiments indicate that it makes a very pleasant dry sherry.

Red Wine Grapes

Among the red grapes **Pinot Meunier** should be mentioned first. This grape does remarkably well in New Zealand, where it should be the mainstay of the New Zealand wine-maker. It is comparatively resistant to fungous diseases and bears regular crops of about 2.5 tons per acre when it is moderately pruned to about 30 buds on each vine. Maturing in mid-March (Fig. 5), it reaches 11 degrees Beaumé sugar content, and with its low acidity it gives a soft wine which will blend well with that of the Cabernet Sauvignon and other varieties of high acidity.

The Pinot grapes, of which the Meunier is an early ripening subvariety, are among the oldest cultivated grape varieties. They are considered indigenous in the Bourgogne of France, where they are largely grown, and mainly determine the character of the world-famous burgundies. In the Champagne district of France (Reims-Epernay) the famous champagnes are mainly made of Pinots. But they are outstanding also in the colder wine regions of Europe and other parts of the world on account of their early maturity. The Pinot Meunier is well known in the Moselle and Wurttemberg in Germany, in the Valais and around Lake Zürich in Switzerland, in the Burgenland of Austria, and on the volcanic soils of Badacsony in Hungary—to give a few examples only—and is a grape of reliable quality all over the world.

Cabernet Sauvignon is another high-quality red grape which should come back to good New Zealand vineyards. It is the best red wine grape of the Médoc district of the Bordeaux region of France, from which the finest claret wines come. Cabernet Sauvignon gives bouquet and flavour to claret, and it should form at least one-third of wine sold under that name. A good claret should possess a fine bouquet, full aroma, and plenty of character, without being high in alcohol—it should not contain more than 10 to 10.5 per cent. of absolute alcohol (17.5 to 18.4 degrees proof spirit).

Cabernet Sauvignon does well in every grape-growing district of the North Island, and on long canes it regularly bears about 2 tons of grapes per acre. With its loose bunch and thick-skinned berries it will stand the weather to the end of March, when it ripens. It is rather more subject to fungous diseases than is Pinot, but it must be planted on well-drained land in a sheltered, sunny position.

As the acidity of Cabernet is fairly high even when the grapes are perfectly ripe, its wine should be blended with a softer wine, and it combines excellently with Pinot Meunier wine.

Selection of Table Grapes

At present the main table grape variety grown outdoors in New Zealand is **Albany Surprise.** This grape is thought to be a seedling of the well-known Isabella grape, a *Vitis labrusca* descendant. Albany Surprise has a rather coarse flavour, with high acidity, and it matures late in the season. It is comparatively resistant to

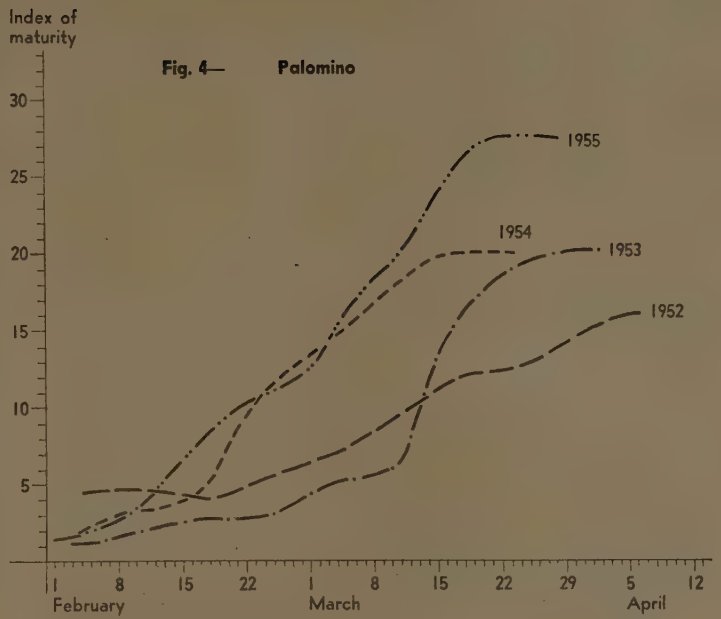

Fig. 4— Palomino

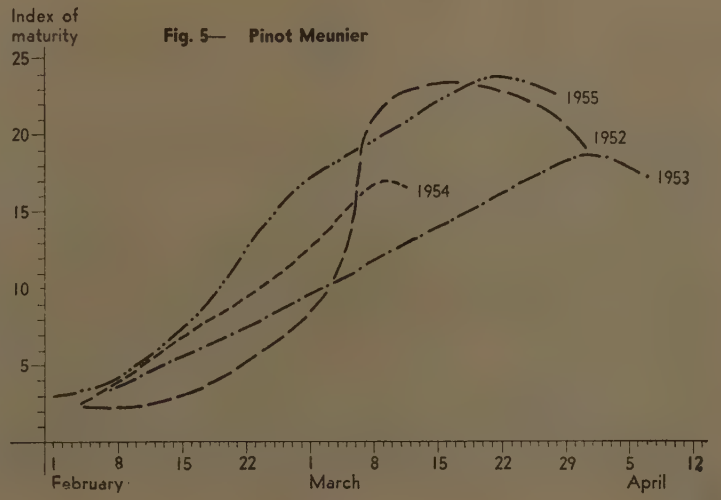

Fig. 5— Pinot Meunier

fungous diseases, but has to be protected from oidium, and downy mildew and black spot will also damage it in humid seasons.

The important points when table grape varieties are being selected are:—

1. Their ripening period should suit the consumers' requirements. It is desirable to have grapes ripening from early February to late April; the very early and late grapes always command premium prices.

2. The grapes should reach the market in perfect condition. For this they must be sound when packed; the berries must have firm flesh and a tough and fairly thick skin which is still agreeable to eat.

3. They must have eye appeal. The bunches should be even in size and shape and loose and not compact, and the berries well formed. Colour is important: For some reason the New Zealand public prefers black grapes, probably because few others have been offered on the market. There are excellent golden, amber, and ruby grapes which could be gradually introduced. Attractively mixed packing often increases the eye appeal.

4. They should have a pleasant taste. Three different flavours are recognised among table grapes, plain sweet, muscat, and *Labrusca* flavour.

Chasselas and **Palomino** grapes, which have a very pleasant, plain sweet taste, were mentioned in the discussion on wine grapes. Recent introductions include the **Pirovano 15.** Though only recently brought to this country from South Africa, it already

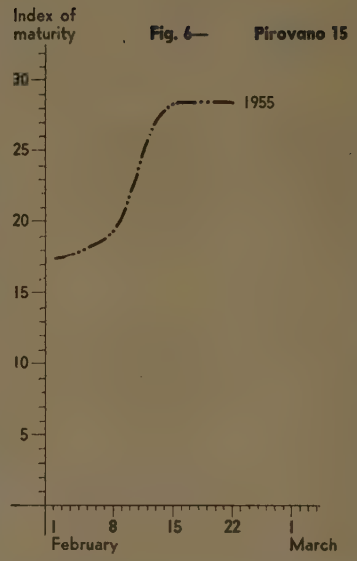

Fig. 6— Pirovano 15

shows great promise. In 1955 it started ripening by 1 February (Fig. 6), and on 7 February it was ready for sale. Pirovano 15, a well-shaped, medium-sized, purple-blue grape, was bred by Alberto Pirovano in Italy. Its pleasant, sweet flavour and good appearance make it a choice, early table grape overseas. At the moment there is not sufficient propagating wood on hand to release it to commercial growers, but it is hoped that in 2 years there will be not only sufficient cuttings but also full data on its cultural requirements.

Another promising table variety is **Pearl of Csaba** (Csabagyöngye), a very early, golden-coloured, muscat table grape, bred in Hungary in the early 1900s. It ripens at the end of January. Investigations include its wine-making possibilities. A promising light-purple muscat grape is **I.P.24**, also the subject of present research work.

Among the *Labrusca* varieties the rose-tinted **Iona** merits attention, its flavour being not as coarse as that of Albany Surprise. A number of *Labrusca* table grapes were recently imported from the New York State Experimental Station and will be included in further investigations. These hardy grapes, partly resistant to diseases, will find a place in home gardens. They are also suitable where spraying cannot be regularly done or where growing conditions are somewhat difficult. Unfortunately their flavour never matches that of the *Vinifera* grapes.

At present a new experimental variety block is being established at Te Kauwhata, as well as smaller blocks in Hawke's Bay and at Henderson. Preliminary observations already indicate that selections from the varieties under observation will add to the number of good grapes which can be grown profitably in New Zealand for both the wine and dessert grape industries.

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Meteorological Records for January

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	66.2	+ 1.3	84.0	47.2	0.50	8	— 4.00	0.23	24	313
Auckland	160	67.6	+ 1.2	80.5	52.9	0.31	3	— 2.87	0.26	1	316
Tauranga	10	65.4	+ 0.8	82.4	48.6	0.33	4	— 3.61	0.15	1	313
Ruakura	131	62.7	— 0.4	81.0	38.2	1.26	3	— 2.22	0.93	1	285
Rotorua	975	63.8	+ 1.0	82.0	43.3	0.70	4	— 3.66	0.41	1	282
Gisborne	12	65.4	+ 0.6	84.6	44.8	1.29	6	— 1.25	0.58	12	288
New Plymouth ..	160	63.2	+ 1.0	80.3	44.5	0.54	6	— 3.93	0.22	1	309
Karioi	2125	59.0	+ 2.0	82.9	32.4	1.17	8	— 2.51	0.50	1	
Napier	5	67.0	+ 1.5	87.0	49.5	0.88	7	— 1.73	0.29	13	301
Wanganui	72	64.6	+ 1.1	81.8	46.9	2.25	5	— 0.53	1.30	5	303
Palmerston North ..	110	64.4	+ 2.0	83.0	43.8	1.96	8	— 1.24	1.40	5	302
Waingawa	340	63.2	+ 0.8	83.8	39.0	2.00	9	— 1.05	0.45	18	306
Wellington	415	63.7	+ 2.7	78.7	46.3	1.25	7	— 1.83	0.41	2	300
Nelson airfield ..	5	62.2	+ 0.6	81.6	45.5	1.07	6	— 1.77	0.55	4	326
Blenheim	12	64.9	+ 2.3	88.6	43.5	0.42	5	— 1.57	0.14	2, 4	335
Hokitika	15	57.4	— 0.7	68.9	40.0	6.42	13	— 3.30	2.88	27	230
Hanmer	1270	61.4	+ 1.7	85.5	34.0	1.01	6	— 2.52	0.60	6	294
Christchurch ..	22	63.8	+ 2.4	87.8	45.0	1.84	6	— 0.39	1.08	6	288
Ashburton	323	63.8	+ 2.8	96.0	40.6	1.39	5	— 1.24	0.77	6	263
Timaru	56	63.2	+ 2.6	86.8	44.8	0.64	6	— 1.73	0.26	27	232
Alexandra	520	63.8	+ 2.1	88.9	41.2	1.08	9	— 0.76	0.61	27	232
Taieri	80	59.0	+ 1.2	84.6	42.5	2.66	13	+ 0.28	0.90	6	186
Invercargill airfield ..	0	56.2	+ 0.0	75.6	40.3	5.65	17	+ 1.92	1.37	26	197
Chatham Islands ..	140	60.7	+ 3.4	72.4	46.0	1.35	8	— 1.43	0.34	5	

Show Dates

THE following are dates and venues of A. and P. shows to the end of April.

6 April—Oxford A. and P. at Oxford.

13 April—Malvern A. and P. at Sheffield.

22 April—Strath Taieri A. and P. at Middlemarch.

*22 April—Mackenzie Highland Show at Fairlie.

WINTER SHOWS

15, 16, 17, and 18 May—Whakatane A. and P. at Whakatane.

*28, 29, 30, and 31 May, 1, 3, and 4 June—Waikato Winter Show at Hamilton.

*30 and 31 May, 1, 3, and 4 June—Otago A. and P. at Dunedin.

*12, 13, 14, and 15 June—Taranaki A. and P. at New Plymouth.

13, 14, and 15 June—Te Kuiti and District Winter Show at Te Kuiti.

25, 26, 27, 28, and 29 June—Whangarei A. and P. Winter Exhibition at Whangarei.

* The Department of Agriculture exhibit will be staged at this show.

Pasture Establishment with the Aid of Chemical Weedkillers

By L. J. MATTHEWS, Weeds Research Officer, and SHONA M. MACLEAN, Research Officer, Department of Agriculture, Wellington

PRELIMINARY trial work on a small plot scale has been undertaken to determine if chemicals can be used to aid the establishment of oversown species by killing the existing turf, thus reducing plant competition. Dalapon, a selective grass killing chemical now available commercially, was used in the trial.

ONE of the important factors leading to successful pasture or crop establishment is the reduction of undesirable plant competition. Cultivation is one of the main methods used, but there are large areas of New Zealand that are too steep to cultivate even with tracklaying equipment. In these areas grasses and clovers have to be introduced by oversowing, but this method often fails to give a substantial improvement in pasture composition. Even with high seeding rates and adequate fertiliser a fairly poor strike of clover is obtained and very few grasses establish. The new seedlings are easily suppressed by the species already present, and grazing to control the growth of the existing species often damages the seedlings before they have become well established.

Trial Work

In the trials various rates of dalapon were applied to a low-fertility browntop-sweet vernal sward 3 months, 5 weeks, and 2 weeks before oversowing in autumn. ATA, in addition to the dalapon, was used in one trial to control flat weeds. The seed mixture was sown at a low and high rate of seeding with a basal dressing of lime, superphosphate, and molybdenum. A further dressing of superphosphate was applied in spring to ensure that the level of soil fertility was sufficiently high to maintain the oversown species.

The trials showed that a rate of 5lb. per acre of dalapon applied within 2 weeks of oversowing allowed the best establishment of perennial ryegrass, cocksfoot, crested dogstail, and white, red, and subterranean clovers. Perennial ryegrass was prominent and there was a dense cover of oversown clovers. Traces of cocksfoot, ryegrass, and clovers that were present before spraying were not killed by the 5lb. rate of dalapon.

The sward of the unsprayed plots was in marked contrast to the sprayed plots. A few oversown grasses had established among the dense turf of browntop and sweet vernal. There was a dense cover of clovers, but much of this was made up of suckling clover and low-producing volunteer strains of white clover.

The higher seeding rate of 20lb. of grasses and 10lb. of clovers proved necessary on sprayed plots, because sufficient seed was required to replace completely the old sward. As the original cover is killed it must be replaced quickly by a good density of oversown species; otherwise weed seeds germinate and establish on the bare ground.

The flat weeds were controlled by the addition of ATA at 1lb. per acre. ATA also suppresses grass growth, so that if ATA is used with dalapon, the rate of dalapon required can be reduced to as low as 1lb. per acre. As ATA is non-selective, it eliminates the volunteer clover species that are present in the sward before spraying.

Further Uses

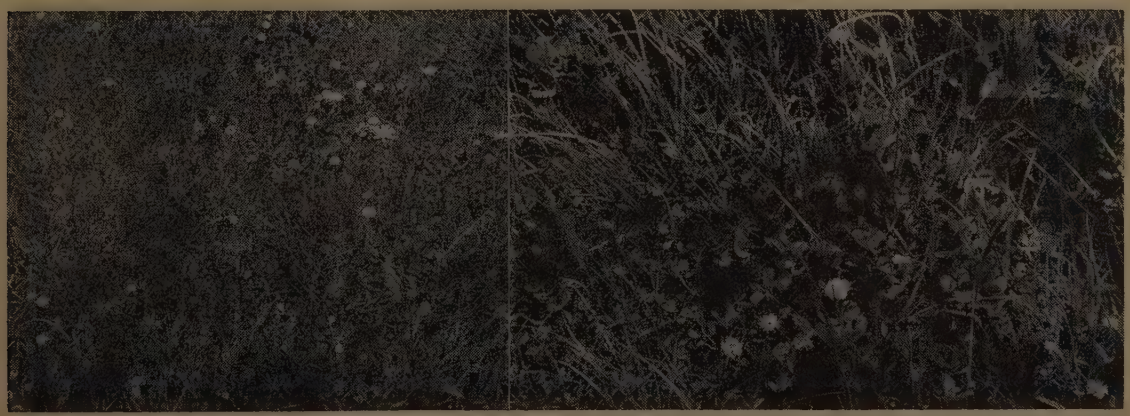
Dalapon or dalapon with ATA can be used to kill the existing turf on country that can be cultivated by tracklaying equipment. This has the advantage of reducing the number of cultivations required to obtain a reasonable seed-bed.

On high-fertility flat areas pilot trials have shown that the same chemicals may be used to kill the existing species, allowing field crops to be drilled directly into the soil. Suitable areas would be pastures that have suffered from drought or winter poaching. The work so far completed indicates that the crops establish weed free and can utilise nitrogen released from the dead turf and animal excreta.

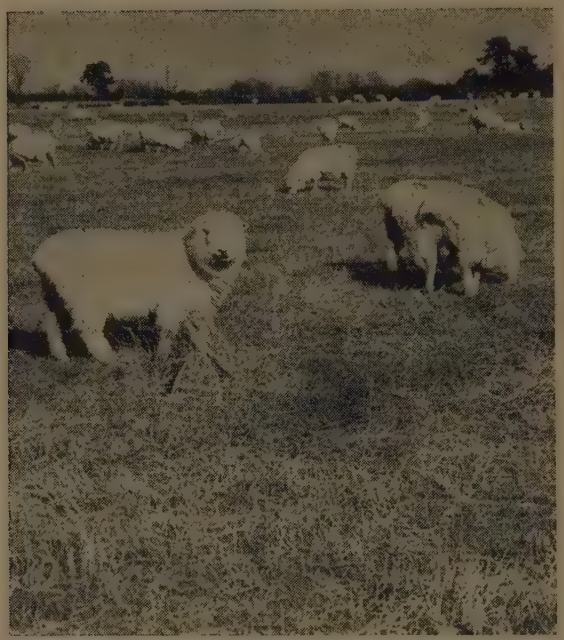
The same weedkillers may also be used to improve the strike of grasses and clovers introduced with sod-seeding machines.

As initial trial work has shown that dalapon, with or without ATA, applied 2 weeks before oversowing greatly assists the establishment of oversown species, the use of chemicals to aid oversowing should gain widespread acceptance. The weedkiller, seed, and fertiliser may be all applied aerially. The possibility of applying the weedkiller, seed, and fertiliser on the same day, provided the existing sward is not too dense, is being investigated.

Left—Unsprayed area: Sward dominantly browntop, sweet vernal, and white and suckling clovers. Right—Sprayed area: Sward dominantly perennial ryegrass, and white, red, and subterranean clovers. The area was sprayed with 5lb. of dalapon 2 weeks before oversowing.



Care of Livestock during April



Contributed by the Animal Research Division

IF rams remain with the ewes for more than 4 weeks, they should be raddled on the brisket so that the late-lambing ewes can be drafted off. Once the ewes are in lamb the level of feeding should be lowered to prevent their becoming too fat. If the rate of stocking is increased during autumn, some paddocks can be shut up and pasture allowed to grow for grazing during the 3 weeks before lambing. These measures will greatly assist in reducing "sleepy sickness", which is more prevalent in fat ewes which are inadequately fed just before lambing. Ewes well fed during the month before lambing produce on the average ½lb. more wool per head than those underfed during this period.

CARE OF EWES

Litters farrowed in December should be sold as pork. If they are carried on to bacon weights, no milk will be available for the later litters, which will have to be sold cheaply as stores or wintered on expensive concentrates. Available root crops may be fed to sows, but they require supplementing with milk or meat meal.

DECEMBER-FARROWED PIGS

Tuberculosis not only causes considerable loss in poultry, but it frequently spreads to pigs, with consequent condemnations at the meat works. If this disease is suspected, veterinary aid should be sought to eliminate affected birds.

TUBERCULOSIS IN POULTRY

If summer and autumn have been wet, lambs are likely to be suffering from worms. Drenching with phenothiazine 2 or 3 times at monthly intervals will help. This applies particularly to the tail of the flock, which should be drafted off for special attention. Feed, however, is the most important consideration. During autumn lambs do best if grazed on pastures which have been allowed to grow to a height of 4in. to 6in. Hay aftermath and clover are very good. If these are not available, the lambs should be distributed thinly over the dairy paddocks or on hill pastures. They should on no account be concentrated in large numbers on short, rapidly growing pastures, especially if these have previously been grazed by ewes and lambs.

CARE OF LAMBS

If a new herd sire will be required this year, now is the time to make inquiries. The New Zealand Dairy Board issues a Sire Survey and Merit Register, which gives the production of the daughters of all dairy sires which have been surveyed. Unfortunately very few progeny-tested sires are available, but the Register should be consulted and wherever possible a bull by a proven sire out of a merit cow should be selected. Bull catalogues are issued annually by the Herd Improvement Association and these, too, should prove of considerable value to dairy farmers who are looking for herd sires. The New Zealand Dairy Board is now developing artificial breeding on a commercial basis and farmers interested in making use of this service should get in touch with the local Herd Improvement Association.

PURCHASE OF HERD SIRE

The best way to prevent calves dying during winter is to treat them properly during autumn. They should never spend more than 2 or 3 days in one paddock, and should be rotated ahead of the cows through the best paddocks available. Good-quality hay should be provided for them daily, especially when the feed is growing fast after autumn rains. Set stocked calves should be drenched with phenothiazine as soon as scouring is noticed.

CARE OF CALVES

A dairy cow requires a reasonable spell between lactations and should be dried off at least 6 weeks before she is due to calve. This should be done even if she is still milking heavily. The drying-off process need not be prolonged; it is quite safe just to stop milking, provided any quarters affected with mastitis are treated with the usual course of 3 tubes of penicillin, the last tube being given after the cow is milked for the last time.

DRYING OFF DAIRY COWS

Early-calving cows are nearly always short of feed during July and August and often during September. In most seasons pasture is not growing fast enough during these months to meet the requirements of milking cows. Crops are expensive to grow and concentrates are even more expensive to buy. It costs nothing, however, to shut up pasture in the middle of April and let it grow for use in early spring. As much as possible of the dairy area should be shut up in this way. Advice on the best paddocks to spell and the best method of feeding the autumn-saved pasture by the use of electric fences can be obtained from local officers of the Department of Agriculture.

AUTUMN-SAVED PASTURE

Autumn Pasture Management

Seasonal Notes by the Extension Division

THE saving of the autumn flush of pasture growth on part of the farm for use by the milking cows some 2 or 3 months later in the season, when feed is very short, is now standard practice on most well-managed dairy farms. This autumn flush of grass, which comes on sheep farms when the ewes should be kept down in condition and do not need it, can and should be saved for use in June and July when the sheep will benefit from the extra feed. It can be saved on the sheep farm in much the same way as it is on the dairy farm by confining the ewes to a portion of the farm to keep them down in condition while the rest of the paddocks are spelled to grow as much feed as possible for use later on.

ROTATIONAL GRAZING

RUNNING ewes in as big mobs as possible through the autumn and winter for the better management and utilisation of the pastures and the easier and better management of the ewes themselves, makes the saving of the autumn flush of growth a feasible proposition. This practice is being adopted by more and more sheep farmers, both on hill country and on fat lamb farms. It is difficult, if not impossible, to do very much about saving autumn growth where the sheep are set stocked and all the paddocks are in use.

The amount of growth made in these spelled paddocks will vary with the fertility of the farm and the type of pasture. On hill country, autumn-saved grass can be held from April and May until July and even early August, when it is invaluable as extra feed to bring the ewes up in condition for lambing. On fat lamb farms, especially those with high carrying capacity, feed saved in April and May can be used in June and early July to bring the ewes forward for lambing in July. These spelled paddocks make remarkably quick recovery after grazing off and are therefore in good condition for the spring.

—C. J. HAMBLYN

* * *

TOPDRESSING

EARLY autumn topdressing with superphosphate increases late autumn and early winter pasture production and where grass-grub or porina (*Oxycanus*) attack is likely DDT should also be applied. Under intensive grass farming the judicious use of nitrogenous fertilisers may be worth while to increase winter grass growth. In the South Island 2- or 3-year-old pastures with a high proportion of short-rotation ryegrass should be treated early enough to allow several weeks of growth before winter. In the North Island, however, experience shows that nitrogenous fertilisers are generally best applied in July to increase early spring growth.

—S. M. J. STOCKDILL

* * *

FEEDING DAIRY HERD

BY autumn spring calved cows have passed their milking peak and consequently there is a tendency for farmers to ease up on their management at this time of the year. This is unfortunate, for though good feeding is not as rewarding in the autumn as at other times, judicious management of the herd and pasture has an important influence on the wintering of the herd and subsequent spring production. When crops are fed in autumn milk production can be held at a reasonably high level and at the same time pastures can be saved for later feeding.

Where no crop is available it is important to remember that for over-all high production winter and spring feeding have the greatest influence. It is consequently unwise to graze pastures bare in the autumn to obtain a few extra pounds of butterfat and be left with no saved pasture and with swards which will recover only very slowly. During periods of autumn feed shortage it is therefore necessary to ration the grass strictly to the milking herd so that some pastures are spelled for winter and spring. Any deficiency in the diet should be made up with hay or preferably silage. It is preferable to feed hay and silage in autumn and save some of the pasture for winter and early spring when nutritious feeding is well rewarded.

—C. M. BLICK

* * *

SEED-BED FOR AUTUMN GRASS

PROBABLY the most serious fault of seed-beds for autumn grass is that they lack firmness. If the seed-bed is not firm, clovers do not strike and without clovers the grasses do not flourish. A properly firmed seed-bed gives an even strike of grasses and clovers and, with efficient after management, a well-balanced pasture of grass and clover. On light land the roller should be used to firm the seed-bed thoroughly and the furrow slices should be rolled before surface working begins. On heavy land the requisite firmness can usually be obtained only after a period of fallow which allows the soil to settle naturally. In both cases the land should be rolled before sowing and, if conditions allow, after sowing also.

—P. W. SMALLFIELD

* * *

HARVESTING THE POTATO CROP

SOUTH ISLAND potato growers will shortly be turning their attention to harvesting. Some will be anxious to get the job over and done with, but the wise grower will remember that the potato is very susceptible to the maltreatment associated with undue speed. He will know that storage losses are caused mainly by lack of care during digging and handling of the produce. Early digging should be confined to potatoes for immediate use and main-crop digging should not be begun until the crop is mature and the skins are hardened. Digging out of warm, dry ground is often followed by heavy losses through soft, wet rots and it is wise to delay harvesting until autumn rains or early frosts have cooled the soil. Physical damage, however slight, will permit the entry of fungous spores and, depending on storage conditions, can result in severe losses through dry rot disease and secondary bacterial soft rots.

Careless operation of the digger often leads to wheels crushing undug rows. Depth should be adjusted to avoid cutting of tubers and to lift sufficient soil to cushion the action of the aprons. Agitation of the aprons should be sufficient only to separate soil from tubers and in free soils the back apron should be removed. Speeding up of the aprons in wet or weedy conditions will cause excessive damage and the hanging of a spare length of apron over the front elevator to break up the soil is to be preferred. Tubers should be allowed to dry before bagging. Rough handling into buckets and severe dumping of sacks should be avoided. To minimise the entrance of potato tuber moth, bags should be sown as soon as possible and haulms should not be placed over open sacks.

—S. M. J. STOCKDILL

Elimination of Clover from Fine Turf in Summer-sports Areas

By L. J. MATTHEWS,
Weeds Research Officer, Department of Agriculture, Wellington

WHERE playing areas are not maintained at a degree of acidity which will eliminate all species other than the desired fine grasses, clovers will often become prominent competitors to the detriment of such sports grounds. In fact the extent to which clovers abound can be regarded as a fairly reliable indication of the degree of acidity that has been created. Such clovers may die out during dry spells, thereby leaving bare patches, which disfigure the surface and destroy its trueness. Though continued acidification will ultimately reduce and possibly eliminate clovers, it also has the effect of destroying grass thrift. Consequently it is sounder to maintain good thrift with reasonable acidity and to rely on spraying with hormone weedkillers to control unwanted species.

THE commonest clover infesting fine turf areas is white clover, a perennial species which usually persists throughout the year. Other common species are suckling clover and subterranean clover. Both are annuals and usually die out during the hot, dry months. Seed of all three clovers germinates in both spring and autumn.

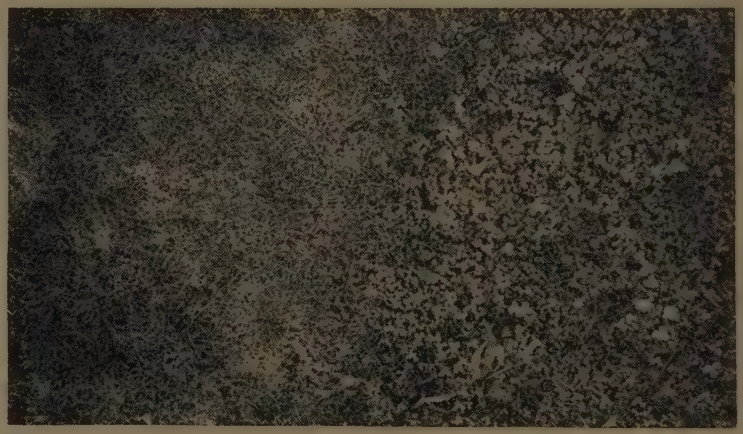
Weedicides for Control

Of all the selective weedkillers available in New Zealand, preparations of 2,4,5-T are the most toxic to clovers. Established white clover and subterranean clover may be greatly reduced or even killed by one application of 2,4,5-T, and established plants of suckling clover and seedlings of all three are readily killed by one application. Of the three species subterranean clover is the most difficult to kill at all stages of growth, but up to the almost mature stage 2,4,5-T will give good control. Fortunately this plant is not so prevalent in lawns as the other two species.

Time of Application

The best time to apply 2,4,5-T is 3 to 4 weeks before the playing season begins. As this will normally be in September the application will control both autumn and spring germinated seedlings and will keep greens free from clovers right through the playing season.

Where clover is particularly serious and some recovers after the initial spring spraying a repeat application should be made in autumn about a month before the normal renovation work is carried out.



Clover eliminated from turf by use of 2,4,5-T (left); untreated area (right).

Rate of Application

For established clovers the rate of application should be from 2lb. to 3lb. acid equivalent of 2,4,5-T per acre. This rate will control subterranean clover at all stages of growth, but for seedling white and suckling clovers 1lb. acid equivalent per acre will suffice.

Forms of 2,4,5-T

The most suitable preparations of 2,4,5-T are the oil-soluble low-volatile esters applied in sufficient water to give an over-all foliage cover. Spot spraying is not recommended, as it often leads to excessive concentration with consequent damage.

Preparations of 2,4,5-T in water in all trial work to date have had no detrimental effect on established browntop and chewings fescue. Often these species seem to respond to the application, probably through the affected clover releasing nitrogen that becomes available to the grass.

Control of Flat Weeds in Addition

Though 2,4,5-T will control most annuals and perennial seedlings, it merely checks the growth of flat weeds such as daisy, dandelion, and plantain. Effective control of these species is obtained with either 2,4-D or MCP preparations. Those of 2,4-D cause more damage to browntop than do MCP preparations.

Unfortunately, as there are no esters of MCP in New Zealand, a mixture of 2,4-D and 2,4,5-T has to be used if the object is to remove both flat weeds and clovers in one application. A suitable mixture is 1 quart of low-volatile oil-based esters of 2,4-D with 3 quarts of low-volatile oil-based esters of 2,4,5-T. The same type of ester and the same proprietary line should be used. The 2,4-D and 2,4,5-T should be mixed together before the water is added.

Young clovers may be removed satisfactorily with 2,4,5-T from newly established grounds, but unless clover is competing seriously with the grasses, spraying of areas sown in autumn should be delayed until spring. The application should be made 3 to 4 weeks before the areas are required for play.

SUMMARY OF WEEDKILLER USE ON PLAYING SURFACES

Type of weed	Stage of growth	Treatment (acid equivalent per acre)	Light infestation (most plants in seedling stage)	Heavy infestation (most plants established)
White ..	Seedling	1lb. 2,4,5-T ..	Treat 3 to 4 weeks before play begins in spring	Treat when weeds have recovered after the playing season and again 3 to 4 weeks before playing season begins
	Established ..	3lb. 2,4,5-T ..		
Suckling ..	Seedling	1lb. 2,4,5-T ..		
	Established ..	1lb. 2,4,5-T ..		
Sub.	Seedling	3lb. 2,4,5-T ..		
	Established ..	3lb. 2,4,5-T ..		
Flat weeds and clovers ..	Mixed stages ..	0.5lb. 2,4-D + 2.5lb. 2,4,5-T		

Beef Cattle and Beef Production in Northland*

By C. E. BALLINGER,
Instructor in Agriculture, Department of Agriculture, Whangarei

NORTHLAND could become an important source of chilled beef for export, since it has advantages of climate and pasture not found in other districts. This applies particularly to Hokianga County and parts of Bay of Islands and Whangarei Counties, where high rainfall and mild temperatures, combined with a mixed pasture containing paspalum, can produce a rapid growth of grass when other districts have no surplus feed.

FARMERS in Northland are already turning off fat steers at about 2½ years, but for the industry to grow the price incentive must be sufficient to allow a big improvement in the hill country pasture. Aerial topdressing is essential for the steeper country. Pasture renewal and renovation on the country that can be worked with the tractor is also necessary to extend the growth of pasture, now chiefly summer- and autumn-growing paspalum.

The overseas market for beef demands a definite weight and quality of carcass. With the demand for the medium-weight carcass from steers of about 2 to 2½ years of age, the animals must be carried through two winters in good condition and cannot be used to crush fern in spring as 2- and 3-year-old steers to the extent that has been the practice in developing hill country in the past.

At present Northland disposes of about half of its cattle as stores for districts farther south. This applies particularly to the drier coastal areas, which have a mild winter with good growth of pasture, but which dry out in summer. Should the demand for chilled beef be sufficiently good, stock could be finished off earlier than 2½ years both by moving forward steers from the high-rainfall areas to the warmer coastal country in late autumn, and by the improvement of the high-rainfall pastures with English grasses for winter growth.

During the last 8 years there has been widespread development both by individual farmers and by large-scale Government land development schemes in Northland, but the trend

Above and below—Yearlings on developed sand country on the west coast.

* **NOTE:** Because of changes in the method of compiling statistics used in this article it has not been considered desirable to present data later than 1952.

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in farming in the North Auckland Land District shows that expansion has not been uniform throughout the district, for while the southern counties such as Franklin, Manukau, Rodney, and Otamatea have expanded in both fat lamb and dairy farming, Whangarei County has expanded in dairying, but not in sheep. Of the five remaining northern counties, Bay of Islands and Hobson Counties have expanded in both sheep and dairying, Hokianga and Mangonui Counties' dairy herds have increased, but their ewe flocks have declined, and Whangaroa County's dairy herds have increased, but its ewe flocks have remained static.

In all the counties there has been an increase in beef breeding stock, though the stock varies considerably in the proportion of breeding ewes to run cows. In Franklin County, for example, breeding ewes increased from 106,859 in 1946 to 172,741 in 1955, an increase of 65,882 in 9 years. Beef cows and heifers rose from 3552 to 5742, an increase of 2190. The ratio of increase was 30 ewes to 1 breeding cow. In Bay of Islands County breeding ewes increased by 19,373 and cows by 4138, or about 4.7 ewes to 1 cow in the same period. Franklin County has reached that stage of intensive sheep farming in which the price of land makes it more profitable or less trouble to buy in steers to fatten on surplus grass than to breed them.

The more northern counties in Northland have not reached the stage of fat lamb and beef farming and high-priced land, but are in the development stage with a surplus of store stock to be disposed of. Of course, some farms in every district produce fat stock for export and local trade.

Beef stock have been used to keep the steeper sheep and cattle country clear of fern, but now, after topdressing, breeding cows and younger stock are used in place of 3-year-old bullocks. Provided the cows are not grazed hard for long periods, but are given a periodic spell on better pasture, this is as satisfactory a method if a little slower.

In this article the beef stock producing area discussed is the northern portion of the North Auckland Land District, or what many would consider to be Northland proper as distinct from the North Auckland Land District, and comprises the six most northern counties; that is the area above a line drawn from Waipu to Dargaville and including the Pouto peninsula on Kaipara Harbour.

The general trend of farming in this area can well be seen from Table 1, which gives the numbers of the three main kinds of breeding stock from 1946 to 1952.

TABLE 1—BREEDING STOCK IN COUNTIES*

Year	Cows in milk	Breeding ewes	Beef cows and heifers	Cows in milk	Breeding ewes	Beef cows and heifers	Cows in milk	Breeding ewes	Beef cows and heifers
	MANGONUI			HOKIANGA			WHANGAROA		
1946	29,350	34,645	5,375	21,441	49,317	7,825	4,498	14,406	1,388
1947	23,440	34,473	5,325	20,489	44,296	6,792	4,565	14,424	1,390
1948	25,043	29,836	5,133	22,174	44,584	6,700	4,915	14,648	1,521
1949	26,284	30,626	5,897	22,567	44,490	7,176	5,244	13,734	1,490
1950	31,618	29,063	5,537	23,102	40,974	6,692	5,815	14,165	1,599
1951	31,722	30,336	5,534	23,356	43,041	7,568	5,719	14,633	1,517
1952	33,338	31,730	6,396	24,277	41,180	8,488	6,497	14,242	1,814
	BAY OF ISLANDS			WHANGAREI			HOBSON		
1946	23,480	62,151	9,005	58,907	97,277	13,873	33,546	77,773	10,465
1947	23,131	62,978	9,187	57,107	89,061	12,968	32,749	78,948	9,776
1948	24,538	64,766	9,360	60,751	89,576	13,460	35,223	79,176	10,316
1949	26,130	62,487	9,538	64,024	88,149	14,942	36,434	78,516	10,497
1950	27,232	60,278	9,481	68,981	90,333	14,299	39,189	78,849	10,884
1951	28,043	65,220	9,571	72,967	92,471	14,017	40,471	83,738	10,712
1952	29,453	67,354	10,141	74,521	90,823	16,417	41,570	81,122	11,842

* Agricultural and pastoral statistics.

Description of Area

A brief description of the area is necessary. The eastern coastal side of Northland from Waipu northward to Whangaroa is mainly undulating to steep hills with only a small proportion of lower less steep slopes and alluvial flats along the rivers. These flats are very valuable in the dry summer and autumn for growth of pasture. Unfortunately, development has been into dairying rather than sheep and cattle farming and the hills have reverted to danthonia or manuka scrub to a considerable extent.

Much of this country will respond to molybdenum and with aerial topdressing could be greatly improved. Between Whangaroa and Mangonui is a large area of undeveloped coastal country, much of which is volcanic

Breeding cows on developed sand country on the west coast.

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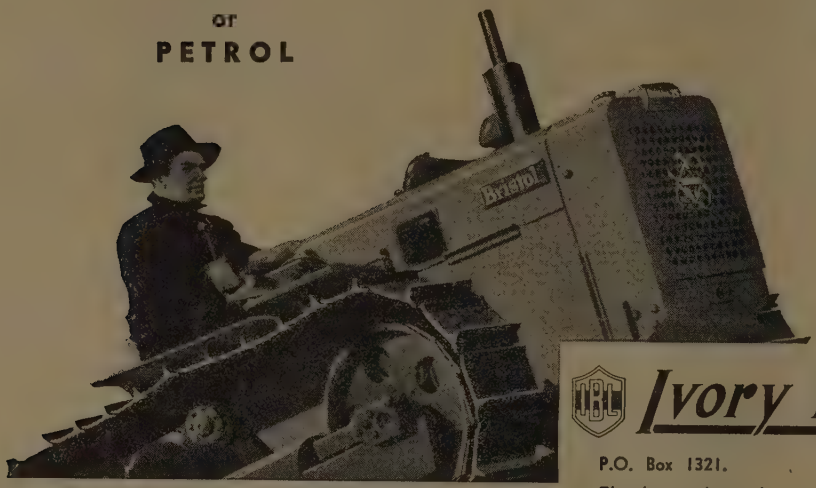

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and is in scrub and fern, but is capable of development and responsive to molybdenum.

From Mangonui to Awanui the country becomes less steep and has a larger variety of soil types including both clay and sandy gumland; areas such as the Taipa block are now being developed on a large scale by the Department of Lands and Survey.

The northern tip of the northern peninsula consists of volcanic, danthonia covered hills and includes the Te Paki cattle and sheep station. Between the station and Awanui stretches mainly undeveloped and easy rolling to flat country derived from sand and peat swamps, flanked on the west coast by sand dunes. This area is being developed mainly as dairy farms. There is a continuation of these classes of country south of Awanui to Ahipara. Large areas of this consolidated and unconsolidated sand country are leased by the Crown to men who graze store beef stock in the area.

At Ahipara the coastal country changes to the steep, volcanic and sandstone hill country of Hokianga which, when improved, will form some of Northland's best cattle and sheep country. This class of country runs down to below the Waipoua Forest, where the coastal country changes to an area of consolidated, sand-derived soils similar to those of the northern peninsula, but with steep gullies. This class of country runs without change to the end of the Pouto peninsula below Dargaville, a distance of about 60 miles. It can become an important source of spring-fattened chilled beef.

From Hokianga in the west across to the Tutamoe Range west of Whangarei is an area of dolerite and andesitic volcanic hills. These also include some of Northland's best cattle and sheep country. The natural fertility is good and reversion is to fern rather than manuka. With good management and without manure much of this country has remained clean. Typical of this class of country is the Mangakahia district. These ranges greatly affect Northland's rainfall, and in addition proximity to bush-covered hills influences the rainfall on the eastern side at such points as Kaeo and Puhipuhi.

Generally, Northland is undulating to hilly, with a small proportion of alluvial flats along the rivers and creeks. In the drier districts it is these flats which are so valuable for fattening beef cattle in autumn. Unfortunately, the flats are used for dairy farming to a great extent, and farms without flats must turn off store cattle. The striking difference between the untopdressed, low-rainfall hill country of the east coast and the higher-rainfall country of Hokianga and other areas is that much of the low-rainfall hills are principally in danthonia and scrub while the Hokianga hills are in paspalum and fern.

The high-rainfall areas include Tutamoe district which, at about 1400ft. above sea level, is cool for paspalum growth, but can grow good swede crops for wintering.

Rainfall

In spite of the relatively narrow distance from the east coast to the west coast, Northland rainfall varies considerably. Winter rainfall is high, but late summer and autumn rain is very local; for example, the Parua Bay area, which is about 15 miles southeast of Whangarei, in 1954 received about 20 inches less rain than Whangarei.

Rainfall in Northland.

General rainfall distribution is shown on the map. The most critical period is January-March, when the monthly average is 1¼in higher on the inland areas than on the coastal and lower-rainfall areas.

The rainfall on the coastal areas, as well as being less than that of the inland and higher country, is often ineffective owing to the drying winds which follow. Run off and evaporation are particularly high on the east coast hills, and the northern peninsula and west coast sand country also dry out rapidly in the prevailing westerly wind. There are fortunately swamp and alluvial flats on the west coast country which carry the stock in dry weather.

Beef Cattle Production

Northland has few large areas which are predominantly sheep and cattle areas, and there are not many roads on which cream lorries do not travel. As in other districts beef cattle are an essential part of sheep farming, and in Northland, with the exception of the Tutamoe district, the higher the rainfall is the better is the paspalum and the greater is the need for beef cattle to control late summer and autumn growth.

Men running beef stock only are frequently those with highly fertile flats who buy in forward stores and finish them off, but who are not rearing stock on the same holding. Since these holdings are high-priced land, it would not be economic to do otherwise.

The position is most clearly shown by a comparison of the dairy, sheep,

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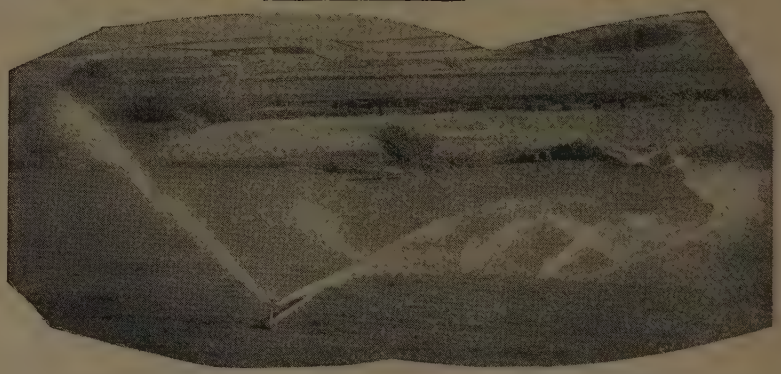

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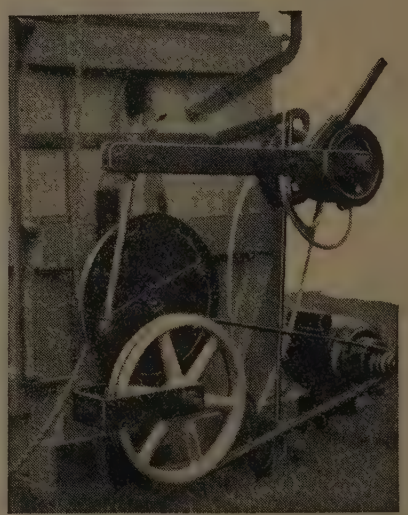

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and beef holdings of the 6 most northern counties in 1949-50:—

TABLE 2—DAIRY, SHEEP, AND BEEF HOLDINGS IN 1949-50

	Dairy	Sheep	Beef
Mangonui	768	52	38
Hokianga	708	60	22
Whangaroa ..	161	19	7
Bay of Islands ..	825	90	63
Whangarei ..	1,534	130	89
Hobson	741	79	44

Though Whangarei County shows the greatest number of all types of holdings, development for some years has been into dairying rather than sheep and cattle, and though dairy cows have increased from 57,107 in 1947 to 74,521 in 1952, an increase of 17,414, beef cows and heifers have increased from 12,968 to 16,417 in the same period, an increase of only 3449. The number of breeding ewes has not altered significantly from about 90,000 during that period. This does not mean that the scope for sheep and cattle has reached its limit in the county. On the contrary, there is a big scope for an increase, both by aerial topdressing of hill country unsuitable for dairying and by development of farms now used for dairying but too large for dairying only.

Stock on high-rainfall country at Tutamoe.

Store Cattle

That Northland is an important source of store cattle may be seen from Table 3, in which store cattle are given for the 6 counties. There is not a great deal of variation from year to year, and in 1952 steers 2 years and over totalled 22,762. Steers of that class in the North Auckland Land District totalled 40,256 for the same year. Northland, therefore, produces about 55 per cent. of the total in the North Auckland district, and from the record of killings given in Table 5, about 5000 of these are killed at Moerewa in addition to those killed for local consumption. About 10,000 steers of 2 years and over go out of Northland annually, mainly as stores for fattening.

The description of Northland and the trend toward dairying show that beef cattle are reared in Northland to control surplus growth and to be disposed of mainly as stores, but that some fat stock are also carried. The surplus stores travel south into districts where fat lamb and beef production on high-priced land go hand in hand. This makes the price of store cattle in Northland dependent on good seasons in districts as far south as Waikato.

In recent years large-scale land development by the Department of Lands and Survey has also increased the demand for store cattle. The demand by districts farther south is at its best in spring and there is a series of sales in the paddocks and saleyards in Northland to meet this demand.

Surplus stock from Te Paki station in the far north and cattle grazed on the west coast sand country trek down the Ninety Mile Beach to Kaitaia. These cattle have been bred under extensive grazing conditions on the coastal country, where the winter carrying capacity, probably about a beast to 10 acres, has been found by trial and error, and where local knowledge is necessary to avoid overgrazing country which is barely consolidated. The level of fertility of such country is low, but serradella and *Lotus hispidus* are useful annuals which grow well in spring, and sheep and cattle do well on them.

There is also a spring draft of cattle from around Mangonui which travel west along the beach to Awanui and Kaitaia. From here stock begin their trek south with other surplus stock from the Hokianga sales at Herekino, Broadwood, and other points. The objective is the railhead at Okaihau, and surplus cattle from southern Hokianga

TABLE 3—STORE CATTLE

Year	Steers, 2 years and over	Steers, 1 year and under 2 years	Steers, calves, under 1 year	Steers 2 years and over	Steers, 1 year and under 2 years	Steers, calves, under 1 year
	MANGONUI			WHANGAROA		
1947 ..	1,995	1,205	1,306	383	353	431
1948 ..	1,889	1,198	1,381	503	379	408
1949 ..	2,119	1,369	1,777	419	499	519
1950 ..	1,920	1,752	1,403	511	341	468
1951 ..	2,203	1,186	1,475	506	447	466
1952 ..	1,550	1,375	1,829	418	443	623
	HOKIANGA			BAY OF ISLANDS		
1947 ..	4,577	2,761	2,189	6,602	2,635	2,690
1948 ..	4,796	2,490	2,482	6,486	2,597	2,754
1949 ..	4,592	2,420	2,932	6,280	3,009	3,395
1950 ..	4,540	2,647	2,421	6,560	2,760	2,919
1951 ..	3,704	2,618	2,667	6,014	2,547	2,518
1952 ..	3,607	2,393	2,867	5,037	3,520	3,335
	WHANGAREI			HOBSON		
1947 ..	8,285	3,929	4,037	4,211	2,363	2,993
1948 ..	8,455	3,362	4,671	4,247	1,924	2,901
1949 ..	8,067	4,395	4,938	4,479	2,298	3,308
1950 ..	7,783	4,079	4,741	3,904	2,119	3,407
1951 ..	7,946	3,635	4,533	2,863	2,241	3,358
1952 ..	8,296	3,851	5,657	3,854	2,603	4,152

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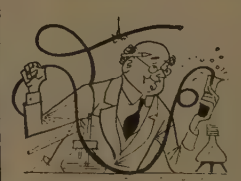

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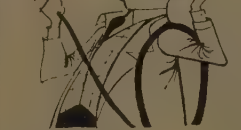

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are also railed here and at Kaikohe. Surplus cattle from Kaeo and the northern portion of the Bay of Islands also go to these points.

Traffic figures supplied by the Railways Department show that during the 3 recent years Okaihau Station has trucked about 2220 cattle and 1365 sheep, and Kaikohe 3660 cattle and 15,000 sheep. The cattle have been railed to destinations south of Bickerstaffe Station and therefore have left the Northland area under discussion. They include a proportion of fat stock for Westfield and some pedigree breeding stock for buyers over a wide area.

Stock from the railhead at Okaihau and Kaikohe are also trucked or driven down to the Kamo saleyards near Whangarei, by owners who prefer selling there. These stock are not included in the numbers given.

South of the Waipoua Forest is a further area of coastal sand country running to the tip of the Pouto peninsula which contributes store stock. Large areas of this country are now being developed into sheep farms, and serradella is giving way to white clover. This coastal country has an early growth and fat lambs are drafted in October and November. Cattle from this area come to the railway from Donnelly's Crossing to Dargaville. Stock from the high-rainfall areas below the Waipoua Forest also come to the rail and yards at various points such as Donnelly's Crossing, Kaihu, and Kirikopuni.

On the eastern side of the Bay of Islands and farther south, store stock move out to the rail at such points as Otiria, Towai, and Whakapara. But there is not the same movement of stock, as dairying is more important in these areas.

The hill country in the drier areas does not require as many cattle to control surplus growth of danthonia and *Lotus hispidus* compared with the growth of browntop, paspalum, and *Lotus uliginosus* (*major*) of the high-rainfall areas. In a dry summer cattle in eastern districts find the small areas of swamp and bush very valuable, and a beast to about 8 acres with burning will control surplus growth. This is in contrast to the high-rainfall areas, where a beast to 4 or 5 acres is normal, and is insufficient in a good autumn, when paspalum makes rapid growth. This is seen by comparing the ratio of breeding ewes to breeding cows in the Hokianga and Whangaroa Counties. Hokianga County falls within the area with high rainfall, that is above 56in. Whangaroa is in a dry area. The ratio of breeding cows to breeding ewes in Hokianga is about 1 to 6, with a tendency for breeding cows to increase and breeding ewes to decline. In Whangaroa County the

Above and below—Bullocks fattening on paspalum country near Hokianga.

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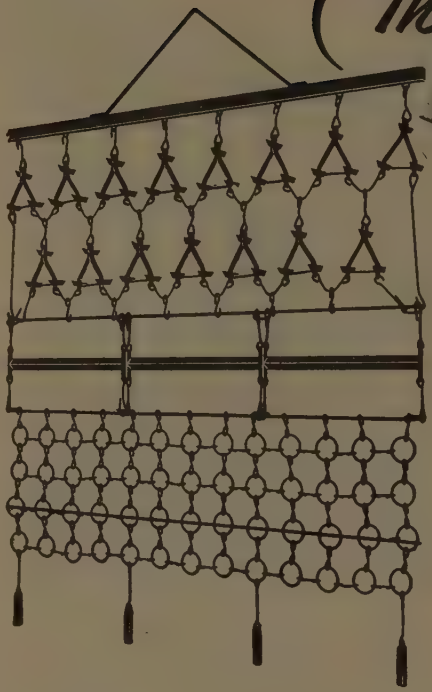

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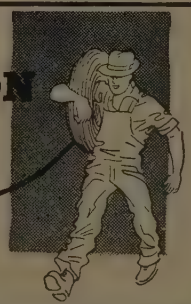

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ratio is at least 1 to 9 or better. The remaining counties have both low- and high-rainfall areas in them and are intermediate in ratio of breeding cows to breeding ewes.

On the drier coastal country the shortage of summer feed is overcome by selling surplus stock as yearlings. The high price of yearlings has made this practice very profitable and convenient for country where control of rank growth and fern is not difficult.

It is interesting to compare the ratio of breeding cows and heifers with steers of 2 years and over in northern counties of the North Auckland Land District with that of the southern and more intensively farmed counties.

TABLE 4—RATIO OF BEEF BREEDING COWS AND HEIFERS TO STEERS OF 2 YEARS OLD AND OVER

(Average over three seasons up to and including 1951-52)

County	Ratio
Mangonui	3.1 : 1.0
Whangaroa	3.4 : 1.0
Hokianga	1.9 : 1.0
Bay of Islands	1.7 : 1.0
Whangarei	1.9 : 1.0
Hobson	3.1 : 1.0
Franklin	1.1 : 1.0
Otamatea	1.7 : 1.0

In the drier and less developed counties of Mangonui and Whangaroa the older steers are disposed of for fattening between 1 and 2 years and the ratio is wide. In Hokianga, with its heavier rainfall and better pasture, the older steers are retained for pasture and fern control. Bay of Islands, Whangarei, and Hobson are intermediate in their need for older cattle, having both high- and low-rainfall areas, and they can also fatten to a greater extent. Franklin County has reached that stage of intensive fat lamb production where steers are bought in for fattening in addition to those reared in the county.

Fat Cattle

In North Auckland, as elsewhere in New Zealand, beef cattle are a necessary factor in hill country sheep farming and in Northland they play a most important part in the control of paspalum growth through autumn. The situation in Northland differs, however, from that of districts where paspalum does not thrive. English grasses decline in growth after the summer flush and beef cattle do their job of cleaning up surplus growth at that period. Unless the season is wet, growth declines on the hills until the autumn rains and beef cattle may not get good fattening pasture for 2 or 3 months.

In Northland paspalum does not grow well until November and its peak growth is from January to April, and therefore takes the place of ryegrass when ryegrass declines in growth. Figures to support this have been obtained at the Dargaville Demonstration Farm, where in 1952-53 there was a New Zealand record production of 19,030lb. of dry matter per acre from a mixed pasture of which about 29 per cent. was paspalum with a similar quantity of perennial ryegrass. With such production alluvial flats will fatten a beast to the acre for some months, and with a good late autumn growth there is a reserve of pasture on which fat stock can be held well into winter.

The scope for fattening cattle in Northland is large, but varies with the districts. The old rule that it takes 2 acres of good grass to fatten a bullock is a fair guide. In the drier areas the land capable of fattening stock is restricted to the alluvial flats and lower slopes, which retain moisture through late summer and autumn.

Without these flats fattening is not possible and becomes less so as the demand for younger and smaller carcasses grows. The high-rainfall areas of Northland have the advantage that though the fertile flats are important, they will be less so if aerial topdressing expands. The hill pastures will then improve and the autumn growth of paspalum which persists into May will allow beef stock to be fattened at 2½ years.

Districts such as Hokianga in particular have a big potential for fat cattle. The freezing works at Moerewa are centrally placed and lorry transport of fat stock over long distances is payable if care is taken not to exhaust and bruise the stock in the lorry with rough driving.

The destination of the fat stock from Northland depends on the activities of the buyers' and farmers' preferences. Fat stock from Dargaville and stations below Whangarei are sometimes trucked back to Moerewa, while on the other hand fat stock from north of Okaihau are often trucked to freezing works at Westfield.

In addition to this production, there is, of course, that killed for an increasing local consumption by the abattoir at Whangarei and the slaughterhouses in the districts. Moerewa also kills for local consumption.

The position of the fat stock industry in Northland can be seen from Table 5, showing killings at the Moerewa Freezing Works, supplied by the Animal Industry Division of the Department of Agriculture.

TABLE 5—KILLINGS AT MOEREWA FREEZING WORKS

Year	Bullocks	Cows	Heifers	Total
1946	3,506	19,164	592	23,262
1947	6,340	22,072	1,251	29,663
1948	6,524	16,643	1,362	24,529
1949	5,532	14,977	1,103	21,612
1950	4,525	16,642	921	22,088
1951	3,526	17,581	814	21,921
1952	4,048	20,083	675	24,806

Northland kills about 20 per cent. of its steers at Moerewa for export and the remainder go south for killing or fattening or are killed locally. Fat cows form a big proportion of the killings, and about a third of the population of about 55,000 breeding cows and heifers are killed each year. Heifers killed are negligible and must be retained for replacements or sold for breeding.

The figures show the beef industry to be fairly static, with fluctuations due to seasonal effects such as the drought of 1946. A drought can have two effects on the market for Northland beef cattle. Should the drought be widespread, there will be no demand for stock for the Waikato, and if possible, the stock are carried over. If the drought is local, there will be a higher than normal disposal of stock in late summer and autumn, some of which otherwise would have been fattened locally.

Examples of Cattle and Sheep Farms

A brief description of holdings from various localities in Northland will indicate the variations in stock-carrying capacity and farm practice in low- and high-rainfall areas (comments as at 1955).

Low-rainfall Eastern Coastal Country

Marua (500 acres): This property has very little flat land and very few easy slopes. Until recently, only about 80 acres were topdressed. It carries 600 ewes and replacement hoggets. Fifty breeding cows are kept and surplus stock are sold as weaners. With no flats and the hills in danthonia, browntop, and scattered paspalum there is a shortage of cattle feed in dry summers.

Waipu (1600 acres): About 500 acres are in bush and scrub, about 100 acres are topdressed; and the remainder is steep hill country. The property carries about 800 ewes, and a beast to 8 acres. On this class of untopdressed country bullocks are slow to mature and are disposed of at about 4½ years old.

Matauri Bay (3400 acres): This property is mostly undulating danthonia country which is being rapidly improved by pasture renewal and has about 600 acres of improved pasture. At present it is carrying about 2000 ewes and 1200 hoggets; 500 breeding cows are kept and surplus stock sold as yearlings.

These examples emphasise the point that without river flats many farmers find breeding cows and the sale of weaners and yearlings the most profitable method of cattle farming.

High-rainfall Areas

Tutamoe: The high-rainfall areas include the well-known Tutamoe district

which, at about 1400ft. above sea level, is cool for paspalum growth, but can grow good swede crops for wintering. An example of this class of country is a 600-acre block now being developed from browntop and punga fern. At present the property has 40 acres of new grass and a further 30 acres of old pasture topdressed. This farm is already carrying 150 cattle, 500 ewes, and up to 300 hoggets. The cattle are sold as 2- and 3-year-old stores.

Trounson Park: As a cattle property the Trounson Kauri Park Estate is of interest. It is run by the Department of Lands and Survey and the pastures are good. The property carries a beast to about 1½ acres and fattens bullocks at 3½ years.

Mangakahia: An example of the well-farmed hill country is a property of 2700 acres of volcanic hill country with a small area of river flat. Until 1954 this block was not topdressed, except the river flats and a few paddocks near the homestead. Aerial topdressing is now being done. The block carries 700 to 800 cattle, of which about 280 are breeding cows. Steers are fattened at 2½ and 3½ years. The property winters 1500 ewes and 800 hoggets, but lambs are not fattened to any extent. Keeping down the sheep and running a good proportion of cattle have eliminated both hard fern and bracken. The scope for increased production with aerial topdressing is obvious. The pasture at present is a typical paspalum, browntop, clover sward.

Nukutawhiti: This property is running cattle only at present, and of the 2300 acres about 300 are in scrub. The property includes 200 acres of river flat. At present it carries 300 breeding cows and 500 other cattle. Steers are fattened at 2½ years. The property is virtually untopdressed, and with topdressing and subdivision production could be more than doubled.

Pipiwai: This farm, like the previous two examples, is on a soil type which responds well to molybdenum. On the area of 1750 acres 400 cattle are carried in addition to 800 ewes and 600 other sheep. About 300 acres have been aerial topdressed for 4 years. All surplus cattle and sheep are fattened.

Tangihua gives an example of chiller beef production on the fairly steep better-class hill country combined with about 100 acres of volcanic flat land. The flat is fertile and has been well topdressed for many years. The total area is about 750 acres. For the last 3 years 200 acres of the hill country have been topdressed in addition to the 100 acres of flat. In 1955 the entire area was topdressed. That year the property wintered 700 head of run stock, of which 200 were breeding cows. With the exception of about 20 bulls and an occasional line of maiden heifers all the stock are sold fat. Thirty to 40 heifers are retained for replacements, and the remainder are fattened. Chilled beef goes off at about 3½ years with carcasses at 600lb. to 650lb. Cull cows are fattened.

With the 100 acres of fertile flat in English grasses, autumn-saved pasture is available for any class of stock which have the best market value, and forward bullocks can be brought in from the hill country for spring fattening.

Hokianga: This farm of 1853 acres is typical in type of much of the Hokianga hill country. The block is carrying at present 100-odd steers, 320 cows and in-calf heifers, and 250 calves.

In addition a flock of 1450 ewes is maintained from which some lambs are fattened and the remaining wether lambs sold as stores. The ewe lambs are wintered. Steers are sold fat at 2½ years. The original bush cover was puriri and totara and when it was felled and the area sown 1lb. of paspalum seed per acre was in the mixture. This has produced a paspalum-dominant sward. For some years before aerial topdressing, about 100 acres were topdressed by hand and later by blower, and during the last 2 years 100 tons a year has been put on by aeroplane.

West Coast Consolidated Sand Country

Pouto: This block of west coast country is restricted for cattle fattening in having only about 100 acres of better class Red Hill sand country in English grasses; the remainder is the less mature Pinaki coastal country. This is serradella country and though the carrying capacity is not high, lambs fatten well on it. The short season of this annual legume leaves a late summer gap of production and a shortage of early autumn feed for cattle. For these reasons it is preferable on this country to breed and sell yearlings. One property, of about 1600 acres, runs 120 breeding cows and 1500 ewes. The first draft of fat lambs go off in October, which indicates the earliness of this country for fattening.

Another property in this block shows what the coastal consolidated sand country can produce when fully developed. It consists of about 575 acres, of which about 100 acres are alluvial flat which retains moisture in the dry autumn and provides a good growth of paspalum. The remainder is undulating Red Hill sand and related soil types, and with the exception of a few acres of swamp to be stumped and regrassed the farm is in good grass.

The farm at present carries about 90 breeding cows, 120 2-year steers, and 80 yearlings. In addition to breeding the owner buys in well-grown yearling steers in spring. As well as the beef stock the farm carries a fat lamb flock of 600 ewes and a stud flock of 350 ewes and other sheep. In good seasons this property can fatten chillers at 18 months onward, killing out at about 500lb.

Yearlings bought for this purpose must be well grown and well wintered, and the provision of hay to keep the yearlings going over the first winter would ensure this. A crop of soft turnips would also be valuable during the dry autumn to keep the young steers going until the autumn rains or to flush the ewes, but the 100 acres of river flat on this property normally makes the provision of autumn turnips for the beef stock unnecessary. The value of this coastal country lies in its mild winter and early spring growth together with a well-drained soil.

Potential Production

The development of the store beef cattle and fat cattle trade will, of course, be governed by demand and the relative price for dairy products, but a minimum of cattle are necessary on sheep country, the number depending on the type of pasture and rainfall and irrespective of their value in the yards.

If prices remain good, aerial topdressing will expand, and there will be an improvement in hill pasture which in turn will require more beef stock. In the higher-rainfall areas this improvement will be rapid, but in the drier coastal areas improvement will be slower. The need for extra stock will grow as the paspalum pastures improve.

The growing scarcity of undeveloped farm lands in other districts is now sending farmers into the more northern counties, and development both by individual farmers and by large development schemes must expand the need for beef cattle. Much of Northland hill country is unsuitable for dairying and the majority of it has never been topdressed. If the demand for fat lamb and beef is maintained, Northland can increase the supply of store stock for fattening in other districts as well as greatly increasing the supply of locally fattened stock. The present production of fat and store cattle indicates Northland's advantages of climate and pasture production for the expansion of the fat cattle industry.

Perennial Ryegrass

By E. G. SMITH,
Instructor in Agriculture, Department of Agriculture, Rangiora

ONE of the most useful and popular grasses for New Zealand soils of high fertility, perennial ryegrass (*Lolium perenne*) may be sown profitably on a wide range of country provided clovers form a good proportion of the sward. Where vigorous clovers can be grown, so can perennial ryegrass. Factors contributing to its value are its excellent seed production, its ease and speed of establishment from seed, its high production of good milk-producing and fattening feed (particularly in spring, when feed is at a premium), its ability to withstand hard grazing, and its permanence under suitable conditions.

PERENNIAL ryegrass is a medium-sized grass with a hairless blade the lower surface of which is shiny. The ligule is short and square cut and the base of the plant is red. Perennial ryegrass can be distinguished from Italian ryegrass by its oval sheath in comparison with the round sheath of Italian ryegrass. The strong awning of Italian ryegrass and the absence of awning in perennial ryegrass are obvious differences at the flowering and seeding stages.

Place in New Zealand Farming

Perennial ryegrass is the basic component of most New Zealand pastures in areas which are intended to remain in grass for more than 3 or 4 years. It is highly nutritious and supplies useful grazing on a wide range of soil types, its productivity being limited by excessive moisture or by low soil fertility and excessive dryness. Under suitable conditions this grass is quick to establish, tending to smother weed growth and supply early grazing.

Perennial ryegrass provides early spring feed and once established thrives under hard grazing. Growth is encouraged by heavy stocking with resultant tramping and building up of soil fertility, this fact being demonstrated by the prolific perennial ryegrass growth round gateways and on camping grounds. However, unless conditions of soil and climate are good, midsummer production is relatively low.

▲ Practically all perennial ryegrass seed is harvested with the header harvester.

A well-drained soil of medium fertility is most favourable for the growth of a perennial ryegrass seed crop. Very high fertility may result in lodged crops, and on the poorer soils plants are unthrifty and of low yield.

Strains of Perennial Ryegrass

During the farming history of New Zealand a number of widely differing strains of perennial ryegrass have been developed. The system of seed production practised for many years in districts such as Hawke's Bay and Poverty Bay, where seed was harvested from old pastures, was conducive to the development of the better strains.

In Canterbury and Otago, where Italian ryegrass was sometimes sown with perennial ryegrass, cross-pollination between the species occurred, and in the absence of any factors which eliminated the poorer types general deterioration took place. Most of the seed was harvested from 1-year-old pastures, and the seed crop was therefore taken before the poor strains had died out. That accounts for the old belief, not borne out by fact, that good seed cannot be harvested from young pasture.

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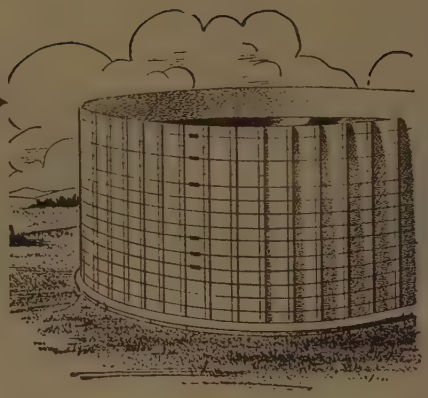

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Provided no volunteer growth has occurred, there is no reason why seed from a first-year stand of Certified perennial ryegrass should not be of quality equal to that taken at a later harvest.

The certification of seed from naturally developed strains was only a stepping stone to something better. By selection and breeding carried out by the Grasslands Division of the Department of Scientific and Industrial Research at Palmerston North a highly improved strain has been evolved. The ability of this strain to persist and recover quickly after hard grazing, its palatability, and its high leaf production are among its outstanding characteristics.

Seed Certification

The object of seed certification is the guarantee to the purchaser of trueness to type. The scheme is based on the identification and isolation of a truly perennial and leafy type. The methods used in its identification include field inspection of growing crops, plot testing, and laboratory testing of seed samples.

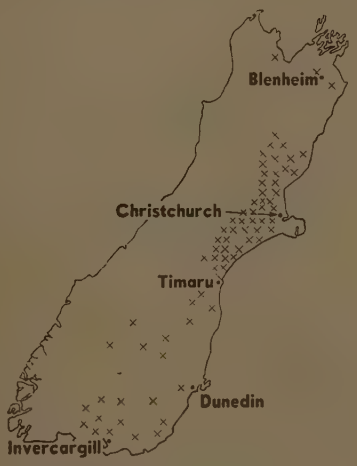
When inaugurated the certification scheme applied to strains of perennial ryegrass that had developed naturally in districts such as Hawke's Bay and Poverty Bay. Many of the perennial ryegrass paddocks in those districts had been down for more than 40 years, with the result that the short-lived strains had died out. The scheme was then based on seed from these areas, but now the improved strains raised by the Grasslands Division form the basis. These stocks are grown on contract to the Department of Agriculture by approved farmers, and from these contract areas Certified Government Stock seed is harvested. This seed is distributed to farmers through merchants each year. Areas sown with Government Stock seed are used primarily for seed production, and from these areas comes Certified Pedigree seed, which in turn is eligible to produce Certified Mother seed.

Perennial ryegrass seed.

All paddocks sown with Certified Government Stock or Pedigree seed which are entered for certification are inspected during the growing season by officers of the Department of Agriculture to determine whether any contamination of the strain has taken place. All sacks containing the produce of areas passing this inspection are branded and sealed before they leave the paddock for machine dressing of the seed. Machine dressing is supervised, and an official sample of the line is forwarded to the Department of Agriculture's Seed-testing Station at Palmerston North for purity and germination tests.

Areas sown with Mother seed, Permanent Pasture seed, or uncertified seed are not inspected, but the produce may be entered for certification under a laboratory test. After being machine dressed the seed is held under temporary seal while an official sample is

The crosses indicate the districts in the North Island where perennial ryegrass is harvested for seed.



The crosses indicate the districts in the South Island where perennial ryegrass is harvested for seed.

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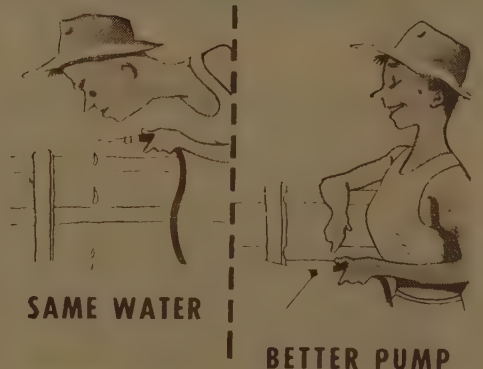

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forwarded to the Seed-testing Station for examination under an ultra-violet light. Under this the germinated seed of poor strains of perennial ryegrass shows a fluorescence which is not evident in good strains. If as a result of this test the seed proves to be of the requisite standard, the sacks are tagged and sealed as Certified Permanent Pasture seed. If it does not reach this standard, the temporary seal is removed.

All lines of Certified perennial ryegrass seed must attain a minimum purity of 97 per cent. before being finally sealed and tagged. A purity and germination certificate covering each line is issued by the Seed-testing Station.

The annual production of Certified perennial ryegrass seed of all classes has amounted in recent years to about half a million bushels. In the 1946-47 season, however, one and a quarter million bushels were produced and in the 1950-51 season one and a half million bushels. The Canterbury Land District accounts for about two-thirds of the total annual production and Hawke's Bay about a fifth.

Palatability

The importance of sowing grass in association with suitable clovers cannot be over-emphasised. Nitrogen supplied to the soil by vigorous clover plants ensures the growth of succulent perennial ryegrass, which, if well controlled, is relished by stock. For some years Certified perennial ryegrass found little favour in the South Island; farmers claimed that it was extremely unpalatable to stock, and this was attributed to the strain of plant. However, experience has shown that the inclusion in the mixture of a good strain of white clover, coupled with judicious stocking and topdressing, will solve the problem of unpalatability.

In the early days of seed certification the sowing of pure stands of perennial ryegrass for seed production was common. This practice is still sometimes adopted on North Island properties, but in the South Island some clover is now always sown. The rapid increase in the use of lime throughout Canterbury has made possible vigorous growth of good strains of white clover where previously acid soil and low fertility limited its growth. Good strains of well-managed perennial ryegrass are not unpalatable to stock.

Seed Production

About 50,000 acres of perennial ryegrass are harvested for seed each year, the greater portion of this acreage being in the Canterbury Land District.

Seed Mixtures

Though seed production may be intended, the primary aim in sowing most pastures should be grazing, and

Perennial ryegrass of poor type under ultra-violet light, showing a high degree of fluorescence surrounding the roots.

for that reason the method of establishing perennial ryegrass for seed production follows very closely that for ordinary grazing pastures. The rate of seeding and the components of the seed mixtures vary with the requirements of the area. Seedings as low as 10lb. of perennial ryegrass and 1lb. to 3lb. of white clover per acre have given excellent results on well-prepared land; on the other hand, seeding rates of more than 2 bushels (40lb.) per acre with clovers may be warranted, particularly to control weed growth. In general, 20lb. to 30lb. of perennial ryegrass with 2lb. to 3lb. of white clover is advocated, the heavier seeding on the better land. Crested dogstail, red clover, or subterranean clover may be included in the mixture if desired.

Where the area is intended for seed production Italian or short-rotation ryegrass must not be included. It is also desirable that different grades of Certified seed should not be sown in one paddock.

In Hawke's Bay perennial ryegrass is frequently sown pure for seed production, as it has been found that in that district the better types of white clover smother ryegrass plants. In Canterbury the general practice is to sow 20lb. to 25lb. of perennial ryegrass with 2lb. to 3lb. of white clover and to harvest perennial ryegrass seed in the first season and white clover seed in the second.

Establishment

Methods of establishing perennial ryegrass vary. In Hawke's Bay excellent results are obtained by sowing 2 bushels per acre following a crop of either peas or potatoes. The land is ploughed directly after the crop, and then well worked and rolled before the seed is broadcast in late March or

Perennial ryegrass is the main component of New Zealand's high-producing swards.

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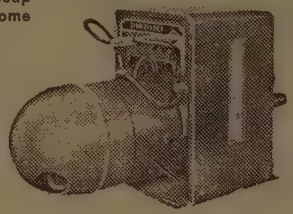

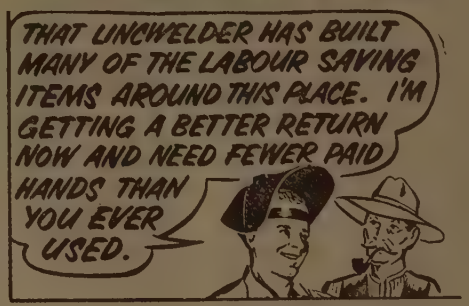
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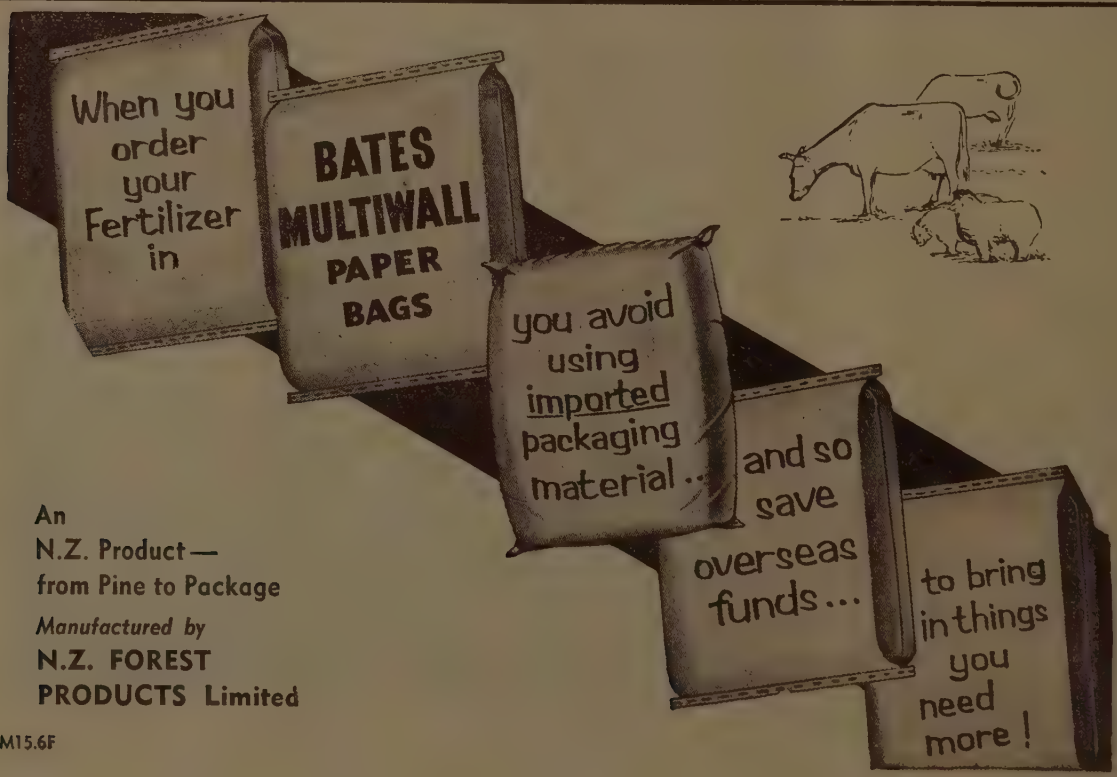
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A perennial ryegrass seed crop being inspected for certification.

during April. Harrowing and a final rolling complete operations.

In Otago and Southland the seed is seldom sown in autumn, the most popular method of establishment being spring and summer sowing with either turnips or rape.

In Canterbury sowing in spring under wheat with rape or turnips or with a spring-sown cereal all have the merit of reducing costs. A common practice is to plough after a cereal crop has been harvested and sow the pasture mixture in late autumn. Though any of these methods of establishment may produce a satisfactory pasture, such practices have certain disadvantages and inferior pastures must often result.

When ryegrass is sown under wheat in spring its establishment is poor in a dry season, and in a wet one the wheat crop may be sufficiently heavy to smother grass growth. Even under normal conditions pastures sown under wheat are usually clover dominant. Ryegrass sown with oats or barley is frequently smothered, though reasonable results are usually obtained from a seeding with linseed or mustard. If the pasture mixture is sown with rape, turnips, or chou moellier, the heavy concentration of stock during the feeding of the supplementary crop is likely to result in injury to the young pasture plants; this is particularly noticeable when rape is fed off during a dry period.

Neither perennial ryegrass nor clover plants can make their best growth when they have to compete with other crops for soil moisture and plant nutrients.

When land is ploughed after a cereal crop soil fertility is often low, and because of the time of harvest hasty cultivation is necessary. Time is too short to allow full advantage to be taken of weathering of the soil, an important feature in the preparation of the seed-bed. Further, the seed-bed is usually not prepared until late in the season. All these factors combine to retard germination and establishment and thereby increase the risk of frost lift during winter.

The most reliable method of establishing perennial ryegrass in Canterbury is undoubtedly to sow in January or early February after a summer fallow. During the fallow moisture has been conserved and weed growth checked, and the soil is warm in early autumn, ensuring rapid germination and vigorous growth. Thus, under normal conditions, useful grazing for sheep during winter and early spring can be confidently expected.

A practice commonly followed in Canterbury is to sow oats for green-feed after a cereal crop and to plough in the residue in October. When this method is used the land is rolled on the furrow to conserve soil moisture. Timely working with grubber, roller, and harrows develops the fine, firm, weed-free seed-bed essential to rapid establishment. Deep working during the final preparation of the land is not desirable, for it not only brings a fresh supply of weed seeds to the surface, but also results in loss of soil moisture. Soil that is well worked retains moisture during a dry period, and if the ground is rolled about a week before the time of sowing, this moisture is brought very close to the surface.

Methods of Sowing

The method of sowing the seed varies from farm to farm and from paddock to paddock. Under favourable conditions broadcasting gives a good spacing of plants and a quick ground cover, but in dry districts many of the seedlings are likely to die soon after germination. Drilling one way has the distinct disadvantage of slow ground coverage, but it is the safest method of sowing, particularly on the lighter soil types, which dry out quickly. Where fertility is high perennial ryegrass and clovers usually grow quickly and soon fill in the spaces between the drills. A sowing method that finds favour principally on the better land is the drilling of the perennial ryegrass and the broadcasting of the clovers.

In many cases cross drilling has proved highly satisfactory. If the work is done efficiently, not only is spacing good, but the seed is placed at a uniform depth in moist soil. Fertiliser is concentrated in the drills with the seed and therefore facilitates

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rapid root development. However, with this method care must be taken to avoid an over-deep sowing, particularly in the first drilling. Drill coulters should be set right back, and where possible worn coulter tips should be used. Rolling between the two drillings is necessary for an even depth of seeding. Possibly the greatest danger in cross drilling is a change of weather. If heavy rain follows the first drilling, the paddock may not be sufficiently dry for the sowing to be completed before the first seed sown has germinated.

There are points for and against each method of sowing, and farmers therefore must be guided in their choice by conditions ruling at the time of sowing.

Recently several types of special drill coulters have come on the market. The use of these results in a substantially better ground cover than with the standard grain drill.

Lime and Fertiliser

No hard-and-fast rules can be laid down for the use of lime and fertiliser, and farmers must be guided by local knowledge. On most South Island farms 1 ton of carbonate of lime per acre should be applied to the land just before sowing. If lime is not available at that time, it should be topdressed on the area as soon as the plants have established. In some districts, particularly in the North Island, the use of lime is not warranted. In practically all cases phosphatic fertiliser should be sown with the seed.

Lime and phosphate promote healthy growth, and adequate topdressing with a suitable phosphatic fertiliser should be done each year, preferably during autumn or early winter. Lime deficiency of the soil should be corrected either by annual topdressing or by heavier applications every 3 or 4 years. The season for the application of lime is not as important as that for fertiliser, topdressing with which gives best results when done during autumn.

Where spring growth is not vigorous nitrogenous fertiliser may be applied at the time the paddock is closed for seed or 2 or 3 weeks later. This will promote grass growth, and in spite of the high price of these fertilisers, the increase in seed yield usually will more than compensate for the expense. If clover is threatening to smother the grass, a dressing such as 2cwt. of sulphate of ammonia per acre will depress the clover growth, but this heavy application is not usually warranted.

Areas to be saved for perennial ryegrass seed should not be grazed heavily during winter and early spring. Lenient grazing of the perennial ryegrass-clover pasture tends to

In the first year after being sown down perennial ryegrass dominates the sward.

In the second and subsequent years clover becomes increasingly common and is often harvested in place of or in conjunction with perennial ryegrass.

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Annual Loss From Hydatids In Sheep Put At £750,000

AUCKLAND, February 10 (P.A.). —Losses through hydatids in sheep and lambs were probably costing the New Zealand meat industry about £750,000 a year, said the chairman of the Meat Board, Mr. J. D. Ormond, in an address to the annual conference of the New Zealand Veterinary Association at The Chateau today.

...how much was *your* loss?

Dogs spread hydatids

Dogs, although not themselves subject to hydatid cysts, can pick up hydatid tapeworms, mainly from eating raw offal. In their droppings, the dogs scatter hydatid eggs which, as dust, are blown on to pasture or adhere to the coats of animals and so reach human hands.

Simple precautions

1. Always boil raw liver, lungs, etc., before feeding to dogs. Otherwise bury or burn all offal.

2. Dose your dog every three months with Arecoline, the vermifuge supplied with your dog license.

3. After handling animals, never put hand to mouth without washing.

4. Be sure children wash hands before every meal.

5. Wash thoroughly all vegetables and fruit eaten raw.

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An announcement from the N.Z. Department of Health

cause shading of the clover plant and thereby inhibit its growth. On the other hand hard winter grazing allows the clovers to make such rapid spring growth that the grass may be smothered.

Time of Closing

The early closing of paddocks for seed production is desirable, but the actual time stock are removed will vary with conditions. The following suggestions can therefore be only a guide.

On land where grass growth is backward because of low soil fertility or late sowing stock should be removed toward the end of September. Under average conditions an area need not be closed from stock until mid-October, and if conditions are favourable for rapid growth, grazing may be carried on into November. On some farms the paddock is required for grazing until it is nearly fit to harvest; stock are then removed and a light seed crop harvested. In some districts sheep are run on the area until harvesting time to keep down such weeds as burr clover.

Harvesting

Hot, dry weather and an absence of strong winds give ideal ripening and harvesting conditions. Rain during the latter period of growth may result in tangled crops with abundant growth of clover and weeds.

Before the advent of the header harvester various harvesting methods were adopted: Some crops were mown and then threshed out of either cock or stack; light crops were handled by the grass seed stripper; and others were reaped and tied before being threshed out of stook or stack. The last method has much to commend it and is still used by some South Island farmers, but most perennial ryegrass crops are now windrowed and picked up with a header harvester. In the North Island this work is generally done by contractors, but in the South Island the farmer usually has his own header harvester.

Light crops may be either direct headed or handled with a grass seed stripper. In such cases the seed is allowed to become fully mature before harvesting is begun, and even then the crop is not in fit condition to be bagged in the usual way. Therefore it is placed in open-meshed sacks, which should be only half filled and then hung on a fence until the seed is thoroughly fit for bagging.

Perennial ryegrass is ready to windrow when it reaches the binder-ripe stage; that is, when the seed is well developed and has lost all trace of greenness. This stage is indicated when a few seeds have fallen and seed comes away readily into a hat swept lightly through the crop. Earlier cutting gives a pinched sample, and if the crop is allowed to become fully mature, loss from shedding is experienced.

A good 11-year-old sward which is harvested for seed occasionally. Under careful management high-producing, weed-free swards can be maintained if the taking of seed crops in consecutive seasons is avoided.

A mower fitted with an inside divider is generally used for windrowing. If the crop is light, windrowing and picking up may be simplified by the use of 2 binders; one taking a 6ft. cut delivers the material from the platform canvas to the ground, and the second, from which the tying apparatus has been removed, takes a 10ft. cut, the material being run over the elevator canvas. Thus the two windrows are placed sufficiently close to enable both to be picked up at one round of the header. Though the header harvester gives best results when fed to reasonable capacity, heavy windrows with consequent overloading of the machine should be avoided.

When the cut material is placed in an even, fairly narrow, and not overbulky row it conditions in a few days and threshes easily. Threshing should never be started before the crop is fit.

As perennial ryegrass is easy to thresh, the concave should be right open and the drum speed about half that used for wheat. Inaccurate setting and fast drum speed result in damaged seed.

The disposal of straw after the header harvesting of perennial ryegrass seed is too often neglected. It is of particular importance if the crop has been fairly bulky. Apart from its smothering effect, straw left lying on the paddock gives shelter to such pests as grass-grub, porina (*Oxycanus*), and slugs, and many good pastures have been ruined by carelessness in this direction. This straw makes quite useful hay if baled directly after heading.

Machine Dressing

Modern seed-cleaning machinery is very efficient, and provided threshing has been done carefully, machine dressing presents no great difficulty. If seed has been harvested before it is fit, it will heat and suffer not only germination injury but also loss of appearance. Goosegrass is probably the most serious impurity in perennial ryegrass seed. If through hard threshing this seed is shelled or the awns are removed from it or such species as Italian ryegrass, their separation from perennial ryegrass by machine dressing is not practicable.

Losses in machine dressing vary from line to line and may range from negligible quantities in seed from very clean paddocks to up to 50 per

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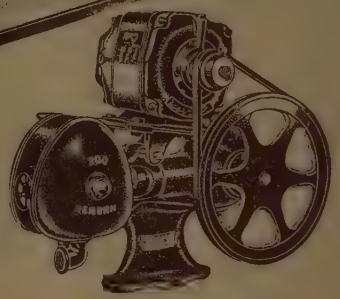

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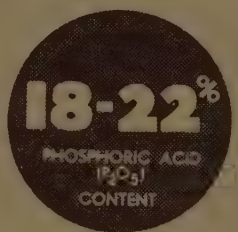

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cent. or more in seed from dirty, weed-infested areas. The average loss over all lines is about 35 per cent., including any white clover seed which may be separated and later recleaned.

Yields

Crops yielding 40 to 50 bushels of machine-dressed seed per acre are by no means uncommon, though the average yield is about 18 bushels.

The possible number of remunerative seed crops depends very largely on management. In Hawke's Bay some pastures have been harvested periodically for up to 80 years and their yields are still high. On the mixed farms of Canterbury the general practice is to harvest perennial ryegrass up to the third and even fourth seasons. From that time it is usual to graze the area until it is again ploughed for supplementary feed or an annual cash crop.

An analysis of the yields in Canterbury for the 1946-47 season shows that areas harvested in the first season average 19.6 bushels per acre; areas which had been grazed right through the first season and harvested in the second season returned the same average yield, but areas which were harvested in both the first and second seasons averaged only 8.4 bushels in the second harvest. Many of these areas may have been treated primarily as white clover seed areas. All areas in their third harvest season averaged 13.2 bushels, these also probably including some handled primarily for white clover seed. As the age of the pastures increased so did the yields, those in their fourth harvest season averaging 14.8 bushels, in their fifth harvest season 16.8 bushels, and areas older than this (a very small proportion) 20.9 bushels per acre.

The bulk of the seed is harvested from young areas, the first crop giving the highest yield. The effect of successive crops is very marked and probably many areas in the second and third seasons are harvested chiefly for the white clover seed they produce.

From this stage onward yields tend to increase and this may be accounted for by the harvesting of seed only from those areas where the perennial ryegrass has had every opportunity to become firmly established. Such areas can produce very satisfactory seed crops.

Subsequent Management

Because of the harvesting of successive seed crops without sufficient spelling perennial ryegrass thins out in many pastures and an invasion of such species as goosegrass and hairgrass occurs. It may be found uneconomic to close such areas for seed, though with suitable management they may be brought back to a highly profitable state.

Both goosegrass and hairgrass are annuals and may be eliminated or at least reduced to harmless proportions in the pasture. The aim should be to prevent their reseeding, and this may be accomplished by grazing and mowing. In summer the seed heads which will appear despite heavy grazing must be cut with a mower before they reach maturity. A spell under grazing permits the perennial ryegrass and clover plants to stool and cover the ground previously occupied by the weed species.

If this grazing and mowing are carried out before the weed infestation becomes too great, recovery to a high-producing state is rapid, but if it is delayed too long, ploughing the pasture will be the only satisfactory alternative.

Diseases and Pests

Blind Seed Disease

Blind seed disease, which in damp seasons causes low germination in ryegrass seed, has presented a serious problem not only to farmers and seed merchants but also to research workers. The trouble is by no means new, but has been brought to notice since the cause was first discovered by Neill and Hyde in 1932. Since then the disease has been isolated in numerous countries.

As perennial ryegrass forms the basis of most New Zealand pastures and is also the main seed exported, blind seed disease, which unfortunately is more prevalent in the better strains, is of considerable economic importance to the country as well as to the seed producer.

The blind seed fungus is carried over from year to year on infected seeds of either ryegrass or other susceptible species, the outward appearance of which may not differ from that of healthy ones. Infected seeds lie dormant in the ground during winter, but with a rise in temperature the fungus revives and small fungous cups (apothecia) develop. In an infected area an examination of the soil surface during November and December will disclose these minute, mushroom-like growths. The fungous cups produce spores which are ejected into the air and carried by wind during the flowering period of the ryegrass plant. Those that alight on open florets may, if suitable damp conditions exist, set up a fungous growth which penetrates the young seed and produces a fresh batch of spores enveloped in a slime which is soluble in water and is further spread by either dew or rain.

Development of the seed depends on the time that infection takes place. Early infection results in light seed, which usually is removed during machine dressing, but with a later infection the seed may appear quite normal and its removal be impossible.

These blind seeds which remain in the machine-dressed sample or fall to the ground at or before harvest complete the life cycle.

The incidence of the disease varies from year to year and district to district and its severity is increased by showery weather between flowering and time of harvest. The incidence is usually less in seed harvested from lodged crops than in seed from standing and open crops.

Since the disease was first recognised research work has been carried out in an endeavour to control it either by treatment of the existing strains or by the breeding of types resistant to it and still having the desirable characteristics of the present pedigree strain. This work is still only in the experimental stage and no recommendations can be made yet. However, some evidence suggests that seed harvested from vigorous stands of perennial ryegrass or from crops which have lodged is of higher germination than that taken from weaker crops.

During recent years a pre-harvest testing service for ryegrass seed crops has been made available to farmers in the main seed-producing districts. This service enables the farmer to know the probable germination of his ryegrass crop before harvesting is begun. Where poor germination is indicated threshing costs may be saved and the crop used for hay.

Ergot

Ergot (*Claviceps purpurea*) in perennial ryegrass is important chiefly because of the seed losses it causes. The disease is easily recognised by the hard black sclerotia which take the place of seed in infected plants.

Infection occurs at the flowering stage, when the fungous spores are blown to the ryegrass flowers, where they germinate and exude a honey-like substance. This substance produces other spores, which are spread by insects to infect further flowers.

The ovaries of infected flowers become enlarged and the black sclerotia develop during summer and either are harvested or fall to the ground. In this stage ergot overwinters before germinating in spring, when ascospores are liberated to cause reinfection of the new generation of flowers.

Measures to control this disease are the use of clean seed, destruction of seed grasses which act as hosts, and prevention of affected plants from seeding.

Rust

Though both stem and leaf rust are relatively common, they are not usually so severe as to reduce germination of the seed, but when infection is severe the yield is affected

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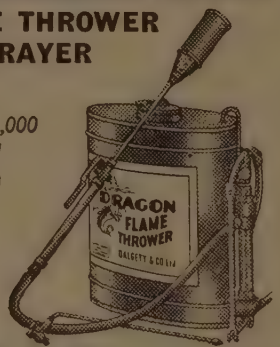

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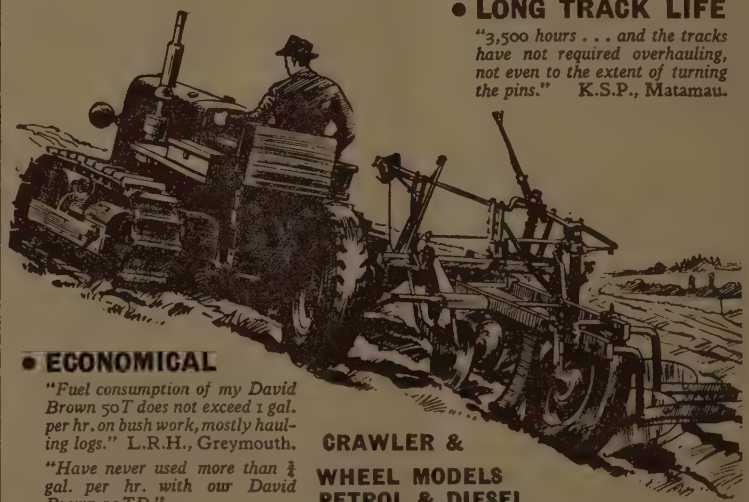

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Grass-grub

Grass-grub (*Costelytra zealandica*) is responsible for the destruction of a large area of pasture. The brown beetle, the adult stage of the grub, lays its eggs chiefly in November and December, about a month later than does the porina moth.

The grass-grub feeds entirely on the roots of the plants, leaving the foliage untouched. As a result of the root damage the plants die off and the soil is left spongy because of the activities of the grub under the surface. The damage is usually evident by early April, and the grub is recognisable by its whitish body, brown head, and horseshoe shape.

Grass-grub can be effectively controlled by DDT or lindane. The following are the suggested treatments: 1lb. of 100 per cent. DDT or lindane in 1000 gallons of water or 1½lb. to 3½lb. of 100 per cent. DDT or lindane per acre in topdressing or dry soil.

Porina

In contrast to the common grass-grub, the porina (*Oxycanus*) or subterranean grass caterpillar is a surface feeder affecting only the foliage or crowns of the plants. This pest, which is up to 2½in. long when fully grown, lives in single vertical burrows 6in. to 9in. below the surface of the soil, emerging at night to feed on the surface. Its colour is usually a greyish green and it has not the distinctive curving of the body which is characteristic of the grass-grub. The soil of an area infested with porina is not made spongy, but remains firm. Though grass-grub damage is most marked on light, friable soils, porina will cause trouble on quite heavy land.

Early recognition of the cause of damage is important. The presence of caterpillars may be recognised by soil casts on the surface which are distinguishable from worm castings by their fine web.

For some years poison baits of either paris green or arsenate of lead gave some control of the pest, but this treatment is less effective than applications of either DDT or lindane. Satisfactory treatments are: 3½lb. of 13 per cent. lindane in 1cwt. of superphosphate per acre or 1lb. of 13 per cent. lindane in 50lb. of bran per acre. (The use of double strength for high-return crops is recommended.) The pest can also be controlled by 2lb. of paris green in 25lb. to 30lb. of bran for populations of under 6 to the square foot.

Areas closed for seed production are particularly subject to attack by either grass-grub or porina.

Army Worms

Attack by the caterpillar known as the army worm may ruin a perennial ryegrass seed crop. This pest derives its common name from its habit of moving in large numbers in definite directions. It often does substantial damage in one paddock while another close by is untouched.

The caterpillar feeds on the foliage and seed heads of the plant, and a crop may be ruined almost overnight if infestation is severe.

An application of 2lb. per acre of 100 per cent. DDT has given good control. When this pest attacks ryegrass seed crops the most satisfactory method of application is by low-volume spraying with either aircraft or a ground plant.

Wheat Sheath Miner

Ryegrass is attacked by a fly (*Cerodonta denticornis*) commonly known as the wheat sheath miner because it also damages wheat. Injury to ryegrass is caused by the maggot or immature stage of the fly sucking the sap from the flowering stem, which results in a premature whitening and loss of the seed head.

The female flies of the wheat sheath miner, which are about 1/12in. long and greyish, emerge in early spring and within 3 days start laying their eggs in the blades of ryegrass. The fly punctures the blade and lays a single egg within the tissue. The egg-laying period lasts about 3 weeks, during which about nine eggs per day are produced. The young maggot hatches in a week and immediately begins to mine in the leaf tissue. As the insect grows its tunnels can be seen with the naked eye as zig-zagging white lines. When the damage is extensive the sap supply is cut off and the leaf wilts, turns brown, and dies. The maggot may then enter the developing flower stem and cut off the sap supply to the seed head, causing the whitening and loss of seed.

The maggot reaches maturity in 9 to 24 days, according to the season. At this period it comes to rest between the sheath and the flowering stem, where it turns into the puparium or resting stage. This puparium, especially when it is present in wheat, is sometimes confused with the "flax seed" stage of the hessian fly, which it resembles superficially. At this time the white straws are observable in the field, so that puparium is the stage in the pest's life history which is usually noticed. The time spent as a puparium is usually 2 weeks or less during summer, but autumn broods overwinter in old straw and grass and the flies emerge from the puparia in spring. Under suitable conditions the time taken from egg to adult is only a few weeks, and there are at least three generations in a season.

The wheat sheath miner is usually present in a ryegrass crop, but only periodically appears in sufficient numbers to be of any significance. A severe outbreak occurred in 1944 in North Canterbury, where in some severely damaged areas there were as many as seven and eight white straws per square foot, whereas other paddocks showed very few damaged straws. However, during the past 3 seasons no significant outbreaks have been reported.

This insect has been introduced into New Zealand and is now found throughout the country. For many years it has appeared periodically in isolated areas, but so far it has not been regarded as a serious pest of perennial ryegrass.

Seed Markets

About half a million acres of land is sown to pasture each year in New Zealand, and if a conservative figure of a bushel of perennial ryegrass seed to the acre is taken as the rate of seeding over the whole area, local consumption of seed is about 5000 tons a year. This figure is probably fairly constant, in contrast with the fluctuating quantities exported from year to year.

New Zealand exports about £250,000 worth of perennial ryegrass seed each year, principally to the United Kingdom and Australia. The bulk of the seed exported is certified, there being no great demand overseas for uncertified seed.

Importance of High Yields

On most farms the saving of perennial ryegrass seed is secondary to the growing of pasture for stock feeding. However, the fact that more than 25,000 acres must be harvested each year to meet local requirements alone indicates that the practice is important in suitable districts.

High prices for seed have encouraged seed harvesting in some districts and under types of management not really suitable. Though reasonable returns may have been received under these conditions, the importance of producing high yields of good seed must not be overlooked. By the application of those practices which will lead to high yields of seed and consequent lower unit costs the grower is at the same time encouraging higher consumption locally and making easier the finding of an overseas outlet for surplus supplies.

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Treating Fence Posts

PLANTATIONS require thinning for their proper development, and there is widespread evidence of neglect of this necessary work in the maintenance of a woodlot. The need for fencing posts, strainers, and battens is also widespread, and to assist farmers to make use of the large quantities of potential fencing represented by material that should be thinned from plantations W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, here describes the simple process employed by one farmer to solve the problem.

FARMERS living handy to centres in which a commercial treatment plant is operating may prefer the easier and perhaps surer method of having their thinnings pressure treated, but for those who are more remote and to whom transport charges are a bigger burden the following description is especially directed.

The process used in this case is known as "cold soaking" in creosote and success depends largely on the timber being thoroughly air dried before treatment.

Preparation of Material

Trees felled in thinning are cross-cut into lengths and peeled as soon as possible afterward. Bark comes off more freely when the posts are freshly cut and it is also easier to peel in spring than at any other time of the year. It is necessary to remove the inner bark as well, since it is impervious to the treating solutions. The best tool for the job is a draw knife, but a small axe is also useful and even a spade may be used when the bark is peeling easily.

After peeling, the posts are open stacked for seasoning; it is necessary that air should be free to circulate through the stack. In very dry localities the stack should be made in a shady spot, because too rapid drying results in deep cracking.

The progress of drying can be watched by regular weighing of a marked and readily removable post from a central position in the stack. When this test piece ceases to lose weight from one weighing to the next it is air dry. The owner of this plant has found that posts cut and peeled in October have been ready for treating about March, depending on the weather.

The Bath

Any one of several kinds of container can be used as a bath, but the one illustrated and described here was made from five 44-gallon drums cut and welded together end to end. A drain cock was fitted to one end and metal lugs were welded to the inner sides of the lips of the open top at intervals throughout its length. These lugs are to hold in place short pieces of 4in. x 1in. board used to keep the posts submerged in the liquid. The whole trough is supported on hollowed blocks near one wall of a corrugated iron building.

Attached to the wall above the trough is a rack to hold posts after removal from the bath. Below the rack is a sheet metal apron sloping downward to the edge of the trough to allow any surplus liquid to drain back into the bath.

The Procedure

To begin treating pour the contents of, say, one 44-gallon drum of creosote into the trough and then fill this with posts. Batten down the posts by engaging the 4in. x 1in. pieces under the lugs along the lips of the trough and add more creosote to cover all of the posts. Leave the posts to soak for 48 hours adding, after 24 hours, enough creosote to make up for the soakage during that period. At the end of the 48 hours lift the posts on to the draining rack and recharge the trough as before. When those on the rack have finished dripping off surplus liquid they may be removed to a stack outside; this can be done the next day when the bath is visited for topping off with creosote.

The period of soaking mentioned is for air-dry posts of radiata pine 5in. to 7in. in diameter. Different immersion times would be necessary for other species and other sizes. The aim is to get an absorption of slightly more than ½ gallon of creosote per cubic foot of wood, that is, the volume of a post 6in. x 4in. x 6ft. long. Poplar battens for instance may require only about 2 hours' soaking.

It is wise to wear rubber gloves when handling wet treated posts to guard against possible skin affections. The posts are safe to handle when dry.

The creosote bath with several posts on the draining rack. The lugs are just below the apron and several 4in. x 1in. battens are lying on the apron.

Hive Management for Section Comb Honey Production

By E. SMAELLIE,
Apiary Instructor, Department of Agriculture, Auckland

COMB honey as gathered and stored by honey bees retains the fullness of its delicate aroma and natural flavour. This feature and the attractive appearance of comb honey make a strong appeal to consumers, and when it is marketed in section squares it finds a ready market at premium prices. Compared with the production of extracted honey, however, the production of section comb honey in commercial quantities is very much more difficult. It demands from the beekeeper more intensive colony management and experienced knowledge of bee behaviour; also of floral sources and the influence of local weather conditions on their secretions of nectar. The production of section comb honey on a commercial basis is mainly specialist work, and in this article, the first of a three-part series, the author describes preparation of equipment. The second article, in next month's issue, describes management after the main honey flow begins and harvesting methods.

THE sale of comb honey sections is regarded by retailers as a speciality trade, and as the market demands only well-finished and attractive sections, section comb honey production can be rewarding to the beekeeper only when whole supers of perfect sections are produced from each colony.

Localities Suitable for Honey Production

In order that a section comb will be uniformly even in finish and appearance it is essential for the bees to build and finish the comb without any pause to the stage where every honey cell is fully capped. To produce sections of this grade in quantity the beekeeper must be favoured with a locality where there is a profusion of suitable flora and a heavy and sustained nectar flow each season.

Because there are wide variations of flora and climatic influence between districts, flows of this nature will not occur with reliability in all areas. Therefore, the first point for the beekeeper's consideration is the suitability of his locality for the production of good comb sections.

Unsuitable districts are those where the average honey flows are light or

Sections in the flat ready for folding, a section partly folded, and a section folded with foundation comb fitted.

Four sections fitted with full sheets of foundation comb in a half-depth section frame ready to be placed in a super.

A separator made from tin plate → has been fitted to the upper section frame, and a separator made from ¼in. hardboard has been used on the lower frame. With either material the bee space within each section is the same and the honey in section is finished to a similar thickness and weight, but hardboard separators give the frames more strength and rigidity.

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▲ Frames fitted with hardboard separators.

Though the frames in each super are pressed together, the spaces between the frames are wider in the super with hardboard separators.

intermittent over a long season, where honey at no stage comes in rapidly, and where honey gathered by the bees granulates in the combs. Areas where the bees gather excessive amounts of propolis should also be avoided wherever possible, as this stains the sections and involves much extra work to clean them. Efforts made to produce section comb honey in quantity under such conditions are usually attended with much crop wastage as a result of poorly finished and underweight sections and with sections that have been made unattractive in appearance with travel stain by the bees. Where these conditions are usual, except in an occasional season as a result of an exceptional honey flow, the production of honey for extraction would be much more satisfactory and profitable.

Preparation of Section Frames

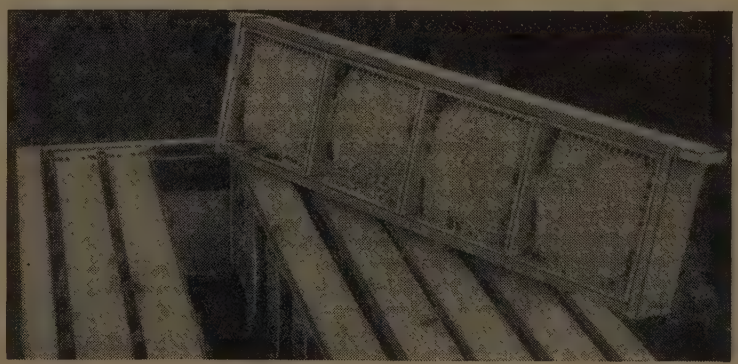
Though more skill and experience are required for section comb production, the capital outlay for establishment is not as great and the honey house equipment is not as complex as are necessary to produce extracted honey. The hive equipment, however, is similar except that to produce section comb honey a different type of frame is used in the honey supers. These frames, known as section frames, are designed to accommodate the wooden sections and in standard Langstroth supers seven such frames can be fitted.

Full-depth section frames accommodate eight sections in two tiers of four, and the half-depth size contains a single tier of four sections, making a total of 56 and 28 sections respectively in each size of super. Each section frame has a strip of tin plate or thin wood tacked along one side with provision for a bee space at top and bottom and the frames are so placed in the hive that each strip forms a separator between the rows of sections in neighbouring frames. Separators used in this manner prevent the bees from joining adjacent sections together; also they compel the bees to build combs of equal thickness so that the finished sections will be about uniform in weight.

Though separators made from tin plate are the most commonly used, the use of $\frac{1}{8}$in. hardboard or wood provides several worthwhile advantages. Frames fitted with tin-plate separators are easily racked or strained out of shape. When this occurs the comb is damaged and this causes the honey to leak and spoil the sections for market. Separators made from wood or hardboard, however, give the frames much more rigidity, and with this additional strength damage from racking or strain does not occur, except when the frames are subjected to extreme pressures.

With the use of either the tin or hardboard separators the bee space within each individual section is the same and the honey in the sections is built to a similar thickness. However, with hardboard separators a wider space is created between each frame which permits additional ventilation throughout the super. This is an important gain in section honey production. A further advantage with hardboard separators is that they do not rust as tin-plate separators do and they are much easier to scrape clean in preparation for further use.

Standard sections are $4\frac{1}{4}$in. x $4\frac{1}{4}$in. These have scallops cut along the sides of the top and bottom to provide beeway into the sections and give the bees access to the supers above. The sections are $\frac{1}{8}$in. thick and are made from carefully selected white pine timber. These are supplied by the manufacturer in the flat with V-cut grooves for folding, a split top bar for holding



A super full of well-finished sections.

[*Sparrow*

A mitre box, showing the method of cutting foundation accurately for sections.

the foundation comb, and dovetails at both ends for joining the section when folded.

Folding the sections, fitting foundation into them, and placing the prepared sections into the super are best done in one operation. To avoid breakage at the corners when the sections are folded they must first be made pliable by hot water poured down the rows of grooves. Care is necessary, however, to ensure that the sections do not remain damp for more than a few days; otherwise the wood will mildew and leave objectionable stains on the finished section combs.

Foundation

Foundation for use in sections is known as thin super, and to produce first-quality sections full sheets should be used in each section, $\frac{3}{16}$in. being allowed at the bottoms for stretching. The use of full sheets enables more bees to enter and work on the combs in the early stages of drawing them out and helps to ensure that the combs will be attached to the wood sections with capped cells on each of the four sides.

Thin super foundation as supplied by the makers is sold at the rate of 28 sheets to the pound. Use of a mitre box will greatly assist quick and accurate cutting of the sheets so that they will fit the sections. The box is made about 2in. deep, with the inside measurements a neat fit for the full-sized sheets. The box is made with three sides, the right-hand end being left open for easier handling of the foundation sheets. Saw cuts spaced 3$\frac{7}{8}$in. apart are made through opposite sides of the box to guide the cutting knife.

When the sheets have been cut they should be the correct size to fit the sections. A room temperature of near 70 degrees F. is ideal when foundation is being cut. With temperatures cooler than this the foundation is liable to shatter or the cut edges will be ragged and this will cause wastage or difficulty when they are being fixed into the sections.

The work of folding the sections, fixing the foundation, and placing the sections in the supers should be part of the beekeeper's winter work. In any event sufficient supers of sections should be prepared in advance of the honey flow to accommodate a maximum crop. Allowance should be made for at least three supers of sections for each colony where this type of production is to be the main crop consideration.

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How to Preserve Peas

Peas are not easy to preserve in the home, but there are satisfactory methods for bottling them or they can be deep frozen or even dried. Full details of the various steps in successful preservation are given in the new Department of Agriculture Bulletin No. 392 "Preservation and Use of Green Peas", by Eleanor Couston, Field Officer in Rural Sociology, Department of Agriculture, Christchurch.

Many attractive recipes in which peas are a main ingredient are given in this bulletin, which is available free from the nearest office of the Department.

Efficient Heating of Dwellings

By H. W. T. EGGERS,
Engineer, Department of Agriculture, Wellington

HUMAN beings can work and live with comfort and efficiency only within a restricted set of physical conditions, which include temperature and humidity. As new facilities for space heating are now available, this article has been prepared to enable the most to be made from the application of heat as an aid to comfortable living.

GENERALLY the temperature at which most human beings are most comfortable is between 60 degrees and 70 degrees F., but this depends on many other factors, such as humidity, clothing, air movement, and whether the individual is doing manual work or resting.

Humidity has a very great effect on human comfort and health. Excessive humidity makes it very difficult for human beings to get rid of the heat produced in their tissues. This heat is normally largely dissipated by evaporation from the surface of the skin. This occurs easily when the humidity is 50 per cent. and lower, but occurs with increasing difficulty as the humidity rises to 100 per cent.

Heat

The unit of volume of heat is the British Thermal Unit (commonly known as B.T.U.). Simply expressed, this is the amount of heat required to raise the temperature of 1lb. of water by 1 degree F.

Every human being produces some 450 B.T.U. of heat every hour and unless this heat is dissipated, the body temperature rises.

The B.T.U. can be expressed in everyday things by the following example: If a kettle of water contains 2½lb. (2 pints) at 62 degrees F., to raise it to boiling point (212 degrees F.) will require $2\frac{1}{2} \times 150 = 375$ B.T.U. Therefore in round figures 375 B.T.U. are needed to raise an ordinary kettle of water to boiling point.

If the measurement of heat volume is understood, the merits of various space-heating appliances can be readily assessed.

With oil-burning apparatus the heat output is usually expressed in B.T.U., but with most of the solid-fuel equipment available in New Zealand, heating capacity is usually expressed in cubic feet of space effectively warmed. This is not a satisfactory method of indicating heating capacity, because the volume of air warmed and the temperature at which it is maintained will depend largely on insulation and air movement. However, where the heating capacity is expressed in

An example of a stage I space heater.

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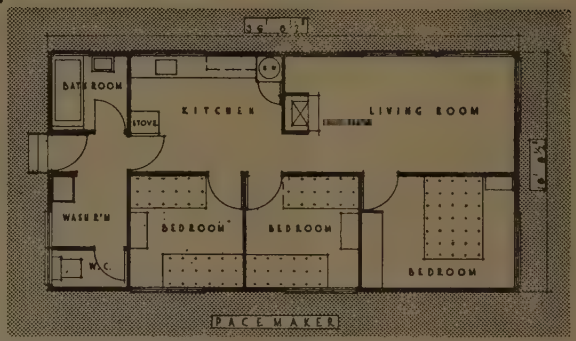

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volume of air heated, the output in B.T.U. is roughly double the volume given for "background warmth" or four times the volume for "full-heating" rating. Though B.T.U. output calculated in this way will be very approximate, it is sufficiently accurate for comparing one appliance with another.

Various fuels have stored chemical energy which, when converted into heat by combustion, will produce varying amounts of heat, depending on the amount and the composition of the combustible material they contain. The total number of B.T.U. which can be obtained from the combustion of any material is known as its calorific value; that is, the heating value of the fuel expressed in B.T.U. The B.T.U. is also used to express the heat-transmission value (U factor) of materials. This is the amount of heat (expressed in B.T.U. per square foot per degree difference of temperature per hour) which will pass through any material.

The heating value of gas is measured by the "therm", which is the ordinary commercial unit of heat and is equal to 100,000 B.T.U.

Appreciation of what the British Thermal Unit is can be of great help in assessing the relative merits of materials or apparatus connected in any way with the production or movement of heat.

Table 1 gives the calorific value of various fuels and Table 2 the heat-transmission value of various materials. The B.T.U. is also the basis for measuring the efficiency of heating apparatus for converting fuel into available heat. This is known as "thermal efficiency" and is the ratio between the amount of heat made available by the apparatus and the potential heating (calorific) value of the fuel.

An efficiency of 10 per cent. means that 10lb. of fuel will have to be burnt to obtain the calorific value of 1lb. as useful heat. For example the calorific value of good coal is 13,000 B.T.U. per pound (Table 1). To make this amount of heat available from an open fire with a thermal efficiency of 10 per cent. requires the burning of 10lb. of coal.

Heat Transfer

There are three ways in which heat can be transferred from one body or substance to another: By radiation, convection, and conduction.

Radiation of heat is the same as radiation of light. A luminous body radiates light in all directions and the intensity of light received per square foot varies inversely as the square of the distance of the object is from the source of light. This applies also in radiation of heat when a small surface only is the radiating source. Pure radiation can exist only in a vacuum, since whenever it occurs in air it is always combined with some degree of convection.

Convection is the transference of heat by particles of air or other fluid body coming in contact with a hot surface, absorbing heat, and passing on and delivering this heat to some other body colder than itself. For example, when a kettle is put on a fire, the bottom is heated and cold water particles in contact with this surface are warmed and rise to the top, releasing some heat to the colder water particles in their passage. The moving particles are replaced by other water particles and this sets up a circulation which continues as long as a fire is maintained under the kettle.

Conduction is the transfer of heat through material. For example, when the temperature on the inside of a brick wall is raised, heat travels through the wall to a lower temperature outside.

Different materials have different rates of transferring heat. Metals and all very dense and heavy materials are usually good conductors; light and porous materials are usually bad conductors. When a material has a very low ability to conduct heat it becomes a good insulator.

Example of Heat Transfer

An everyday example of heat transfer occurs in the ordinary domestic refrigerator. In this machine expanded gas at low temperature is circulated through tubular coils inside an insulated cabinet. As the temperature of the gas is much lower than that inside the cabinet, heat will flow from the cabinet to the gas by conduction through the walls of the coils containing the gas. The circulating gas as it absorbs heat is carried away and replaced by more cold gas, which absorbs heat in its turn, maintaining an even cooling cycle.

The warmed, expanded gas is drawn away from the coils in the insulated cabinet and compressed. This raises the temperature of the gas by concentrating the heat into a smaller volume of gas, the gas now being warmer than normal air temperature. This warmed gas is again passed through tubular coils outside the insulated cabinet and the heat flows from these coils into the lower temperature of the atmosphere. The compressed gas having given up its heat is returned and expanded to absorb more heat. The walls of the insulated cabinet are filled with a material which has a high resistance to the passage of heat by conduction and so prevents the flow of heat from the outside to the inside of the cabinet.

Heating of Dwellings

In temperate climates such as New Zealand's the problem is how to attain comfortable warmth in dwellings during the cold periods of the year with the least cost in fuel or labour. This problem goes deeper than just supplying a source of heat, as the amount of heat required will depend on the degree of the insulation of the walls, roof, and floor of the dwelling. The efficiency with which fuel is used will dictate the amount of heat which can be made available from any source.

Under these circumstances good heating will depend on good insulation and ventilation, good heat distribution, and economic conversion of fuel to heat.

Insulation

Though New Zealand has a relatively moderate climate, insulation of dwellings is not given the consideration it should receive to produce more comfortable living. Insulation ensures warmth in winter and coolness in summer with the least expenditure of energy. With dwellings general building practice relies on a cavity wall to effect some degree of insulation, but building materials are not usually considered as much for their insulating qualities as for their ease of handling and suitability as structural materials. Excessive cost may preclude the use of some insulation materials, but reasonably good insulation can be obtained at very little extra cost if discrimination is used in the choice of materials and in design.

When the outside temperature is low, the natural flow of heat is from the inside to the outside, or vice versa when the outside temperature is the higher. Walls designed to retard this heat flow and constructed of good insulating materials considerably reduce the heat losses from the inside when the outside temperature is low. This means that less heat is required to maintain comfortable temperatures inside when the outside temperatures are low.

Few people would tolerate a leaking water tank, yet many are content to construct dwellings which "leak" heat as a perforated tin leaks water. Materials are now available with good insulating qualities which, if incorporated in concrete or plaster, still retain their insulating qualities. Internal lining boards with very high insulating properties are available, as also are insulating materials which are suitable for filling cavities in hollow walls or placing between ceiling joists. Insulating material is available in the form of board, granular powder, slabs, or padding suitable for any structural application.

Structural design can also contribute to better insulation. With cavity (hollow) walls, which is the usual construction for dwellings, the passage of heat from the inside to the outside is by conduction through the inner and outer skins and by convection inside the cavity. That is, heat passes through the inner skin by conduction, is carried to the outer skin by convection, with the moving air inside the cavity acting as a vehicle, and passes through the outer skin by conduction.

Air is an excellent insulator if it can be restrained from moving. If air

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is contained in a cell or pocket so small that it is prevented from circulating, it cannot transfer heat by convection. The best insulating materials are, therefore, those which contain the most air in the smallest pockets.

The more restraint which can be put on air inside wall cavities the greater will be the degree of insulation obtained. On the other hand, with present conventional methods of construction, air circulation in cavities is essential to ensure dryness. These two conflicting aims can be reconciled by the employment of a double cavity, an outer one in which air is permitted to circulate to ensure dryness and an inner one in which the movement of air is restrained as an aid to better insulation. This is all a question of design and cost; if designed correctly, double cavity walls can be provided at a little extra cost, which is amply repaid by the added insulation obtained.

In dwelling construction, unless expensive precautions are taken, some heat loss through windows and by air circulation under doors is inevitable. However, provided the total heat loss can be reduced to a minimum compatible with economy, the maintaining of a comfortable temperature inside the building is neither difficult nor uneconomic.

Ventilation

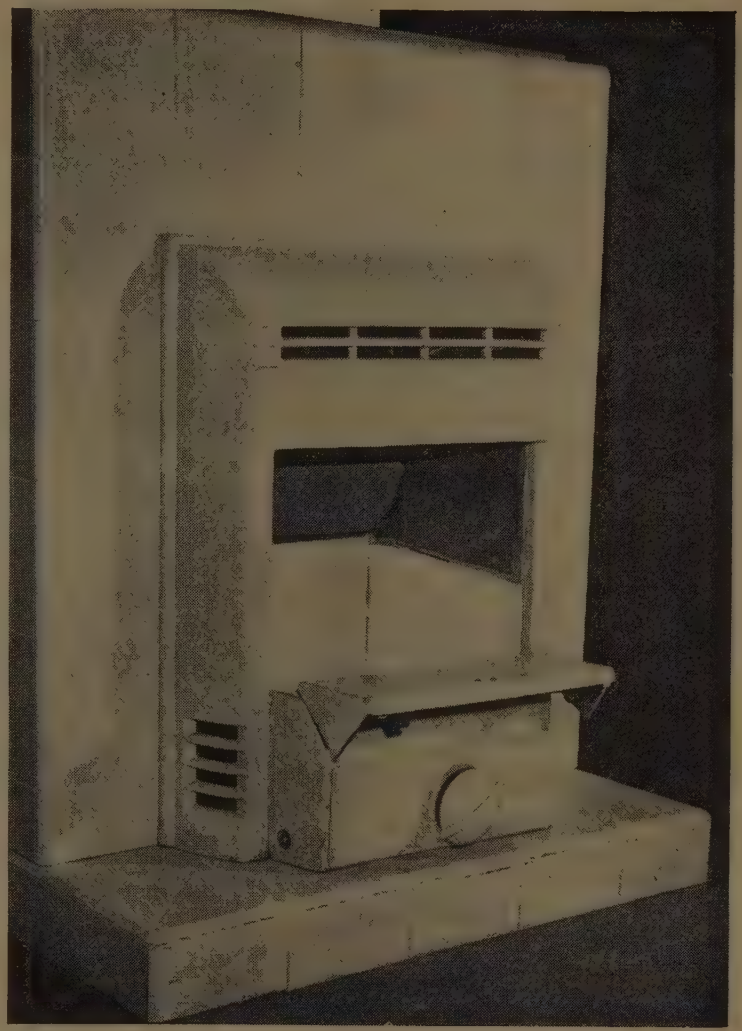
Humidity plays an important part in comfortable living. For example, if the air inside a dwelling is heated to a comfortable 60 degrees F. and maintained at that temperature without any air change, the contained moisture would be lost by condensation and the air would become so dry that conditions would become uncomfortable. Equipment to maintain both temperature and humidity at comfortable levels by mechanical means is too costly to be considered for the average dwelling, so other methods must be used to maintain comfortable humidity. This can be done by ventilation, that is, by permitting frequent air change to occur with the least interference with temperature.

With the oldest method of dwelling heating, the open fire, this air change takes place automatically, as the heat of the fire causes a flow of air up the chimney which is replaced by air admitted under doors and round or through windows.

If the heating system for a dwelling is designed in conjunction with the means of ventilation and with due regard to insulation, very satisfactory results can be obtained and the inside of the dwelling can be kept comfortable, both as regards temperature and humidity, as long as the outside temperature remains low.

Heating Appliances

Heating appliances may be divided into two groups: Those associated with a central system and those where local heating in the various rooms of a building occurs.



An example of a stage 2 space heater.

The former includes hot-water or steam-radiation systems, whether supplied with heat produced from electricity or any of the other fuels, and heated-air circulating systems, where the air is conveyed by duct and fan. The latter include the open fireplace, the various types of stoves, gas fires, electric radiators, or portable, liquid-fuel heaters.

The first group is not generally applicable to domestic heating under New Zealand conditions, but as there is heating apparatus which combines some features of both groups, central heating will be touched on in the following discussion of appliances.

Open Fireplace

Some people prefer an open fireplace, principally because of its cheerful appearance, but its disadvantages should be realised.

The open coal fire, unfortunately, has a very low thermal efficiency of about 10 to 15 per cent., which means that from six to nine times as much fuel as is necessary is being burnt. Actually its efficiency is even worse than this, because an open fireplace as normally constructed does not

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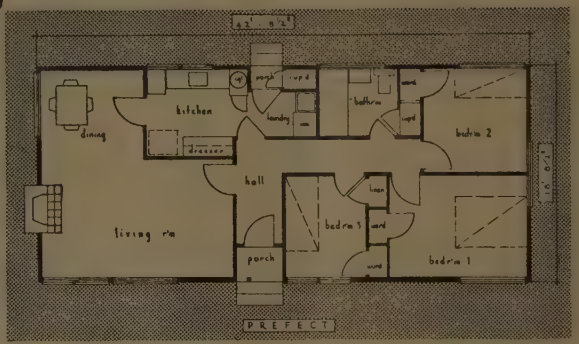

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Editor: A. G. G. HILL

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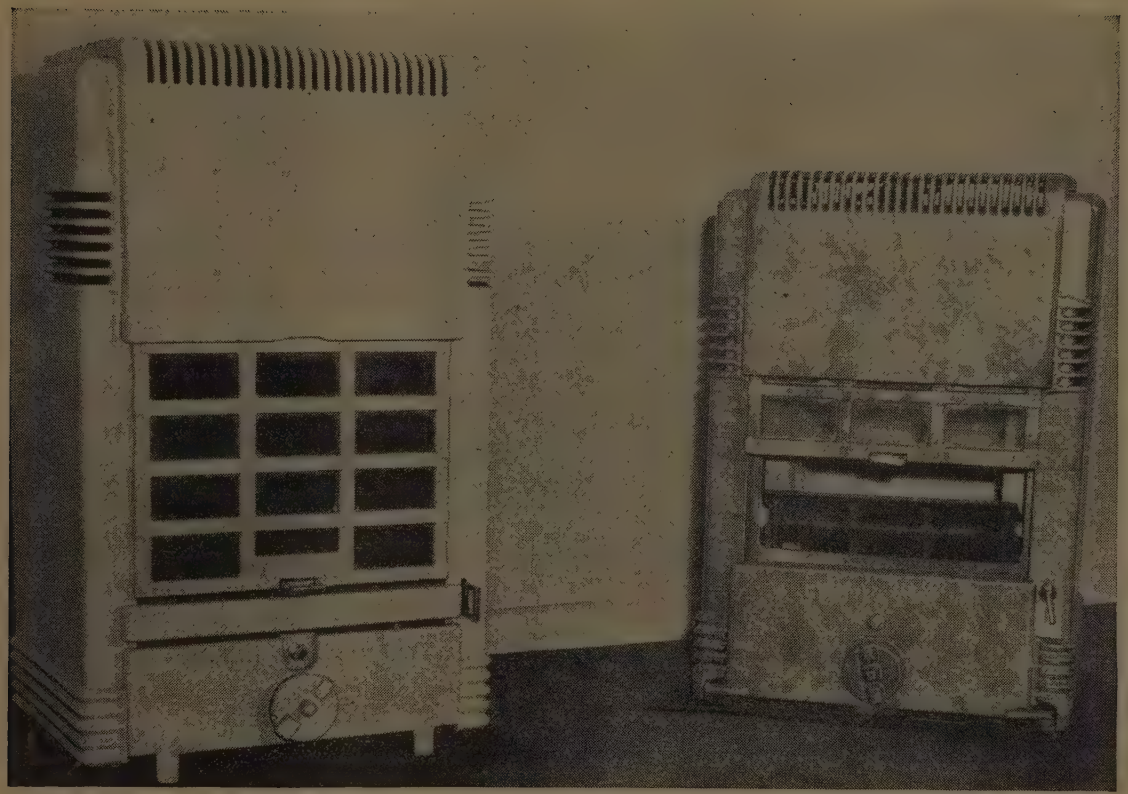


▲ Examples of stage 3 space heaters.

smoke out the room only when the chimney shaft is a good deal bigger than is theoretically necessary. A great deal of air has therefore to be discharged up the chimney, and this air has to be replaced with cold air which finds its way into the room through the porous walls and through cracks in doors and windows. If this replacement of air did not occur, the fire would go out.

The heating of all this additional air from the outside temperature at which it enters to the temperature of discharge from the fireplace represents a large amount of additional heat which the fire has to provide and which is all wasted in excess ventilation. This additional air movement may be as much as 20,000 cub. ft. per hour. It may be argued that this excess ventilation will ensure a freshness of atmosphere and an adequate air change and so avoid stuffiness. This may be true, but who is not familiar with the situation when a door or window is on the side of the room remote from the fireplace: a person sitting in front of the fire has his face scorched by the fire while his back is subjected to cold draughts. The position is usually only aggravated when more fuel is put on the fire to offset the draughts.

Of course the draughts can be eliminated largely if the windows are really close fitting and if the air comes in from an opening under a door on to a corridor or lobby which is itself heated by radiators or otherwise so that the incoming air is already warmed. Then the fire acts mainly as a centre of attraction—a focus for the social gathering and a source of radiant heat additional to the basic warming of the room. The only heat available from an open fire is that conveyed by radiation, unless steps are taken to transfer heat by installing a water jacket in the fireplace.

The open fireplace has been discussed at some length, as the range of solid-fuel space-heating appliances covers various stages between the fully open fire and the totally enclosed heating stove. These will be discussed in the order of their stages.

Solid-fuel Appliances

The basic design of all solid-fuel space-heating appliances centres round one or more of the following features:—

1. The control of combustion by the control of air to the fire.

2. The utilisation of heat by convection.

3. The control of flue velocities.

Designs based on these features have produced heating appliances with greatly increased thermal efficiency; that is, much more heat is made available from the same quantity of fuel or inversely less fuel is required to produce the same quantity of heat.

Stage 1 Heaters

For those who prefer the aesthetic appeal of an open fire to the totally enclosed heater but who also require better control of heat there are available types of fireplaces which control combustion by the control only of air to the fire. By fine regulation of the air available to the fire from under the grate the rate of combustion can be controlled fairly closely, as this air

supplies the oxygen which sustains combustion.

If air circulation through the fire is not permitted, the fire will go out, so under-grate air control can produce any rate of combustion up to the completely free combustion of the open fire. A fireplace with under-grate control may not be any more efficient in supply of heat from fuel used than an uncontrolled open fire, as heat is still conveyed by radiation only. However, as combustion is slowed down the amount of cold air drawn through the room and passed up the chimney may also be decreased. A stage 1 heater is illustrated on page 293.

Stage 2 Heaters

There is also available a fireplace combining control of combustion, utilisation of heat by convection, and control of flue velocities, but at the same time having the aesthetic appeal of an open fire. A fireplace of this type is shown on page 297.

In this type the firebox is brought forward a few inches and an outer surround provided to permit induced circulation of air up the sides of the firebox and over a portion of the top of the throat plate. Combustion is controlled by under-grate air control as for stage 1 and heat additional to that given off by radiation is made available by convection with air flow round the protruding firebox.

The throat of this fireplace is provided with an adjustable damper which can restrict the smoke outlet to an area of about 4 sq. in. This limits very severely the amount of cold air which will be drawn through the room and passed up the chimney. This not only increases the heating efficiency, but eliminates most of the cold draught through the room, which is one of the most unsatisfactory features of the conventional open fire.

The efficiency of these fireplaces is approximately 35 per cent. under normal burning conditions, but, whereas the open fire requires as much as 20,000 cub. ft. of air per hour, this fire requires only 2000 to 2500 cub. ft. per hour.

Stage 3 Heaters

There are a number of various makes of space-heating stoves which can be classed as stage 3 heaters, as all are provided with doors to the firebox, which can be opened to give some of the comfort of the open fire. Types of these stoves are illustrated on page 299. These all have control of combustion by the control of air to the fire and utilisation of heat by convection. Control of flue velocities is provided by total enclosure rather than by the use of dampers or a restricted throat.

These stoves consist roughly of two boxes, one inside the other, the space between the inside firebox and the ventilated outer surround being used for the transfer of heat by convection. All these stoves protrude for their full depth in order to utilise all the side-wall heat for transfer by convection. Combustion is controlled by under-grate air control, and the entrance of cold air directly into the flue is not possible when the doors are closed.

With the doors closed the amount of heat available by radiation is relatively small in comparison with the fireplaces of stages 1 and 2, but a very much greater amount of heat is transferred by convection.

This transfer of heat by convection is excellent for space heating of dwellings, in which ceilings are not usually very high, as the heated air circulates upward from the stove toward the ceiling and returns at lower levels to the stove. The stove does not induce cold draughts, but keeps one room pleasantly and evenly warmed. If doors to the room are left open to allow warm air to circulate, the warm air will take the chill from the whole house, though its efficiency in this respect will depend on the design of the house and position of the heater.

Models of most of these stoves can be obtained with hot-water boilers incorporated for connecting to hot-water storage cylinders. This, though reducing the heat output available for space heating, does reduce electric water-heating costs, and when the stove water-heating system is coupled with electric water-heating ensures a constant supply of hot water within the capacity of the storage provided.

The efficiency of these stoves, examples of which are shown on page 299, is about 50 to 60 per cent., and air consumption is about 200 cub. ft. per hour.

Stage 4 Heaters

Stage 4 space heaters (see illustration on page 301) are totally enclosed. Doors are provided for admission of fuel only and the stoves will not operate effectively if the doors are left open. The fronts or doors of these stoves are usually provided with transparent windows, as are stage 3 stoves, so that the fire is visible, but the amount of heat available by radiation is very small, nearly all heat transfer being by convection.

Instead of circulating and warming internal air, some models can be arranged to draw in air from outside. This is heated and passed into the room. If the necessary controls are provided, circulation of outside air can be arranged as an alternative to internal circulation. This arrangement is an advantage, because comfortable humidity can be obtained without the need for admission of unheated outside air through normal ventilation channels.

Stage 4 heaters embody combustion control by control of air to the fire and by control of flue velocities, the latter being obtained either by an uptake damper or a restricted throat. They rely almost entirely on convection for heat transfer and accordingly are designed with as large a heat-releasing surface as possible in the heat-transfer chamber.

Efficiency is in the vicinity of 50 to 60 per cent. and air consumption is over 200 cub. ft. per hour.

Oil Heating

All the space-heating equipment so far mentioned is designed to burn solid fuel. Other equipment suitable for domestic installation is available which uses oil fuel. Oil and electricity may be considered the ideal sources of heat, as both can be subjected to automatic control. Once switched on and given a constant supply of power or fuel, equipment using them will maintain internal air temperature at constant levels, irrespective of outside variations unless temperatures inside and outside vary so greatly that heat loss through the fabric of the building exceeds the capacity of the heating plant.

Oil-burning space heaters can be arranged to circulate internal air, external air, or both, and burners only can be obtained for converting existing convection heaters or water heaters to oil firing.

The principle of heat transfer is the same as that employed in stage 3 and stage 4 solid-fuel stoves in that the walls of the firebox or combustion chamber transmit the heat to the circulating air passages. Flue velocity plays an important part in oil firing and special attention is given to ensure that this is suited to the particular installation.

Though manually controlled oil burners can be obtained for incorporation in space heaters, all burners are arranged for electric control so that firing can be started or stopped by moving a switch. Thermostats placed at strategic points and pre-set to the temperature required regulate the flow of oil in accordance with the demand for heat. Like all apparatus oil-burning space heaters require periodical maintenance to keep them functioning at highest efficiency.

A great advantage of oil-fired heaters is that they can be placed below floor level with a grating to provide air circulation. If the heater is below floor level on a wall line, hot air circulation to two rooms simultaneously can be provided.

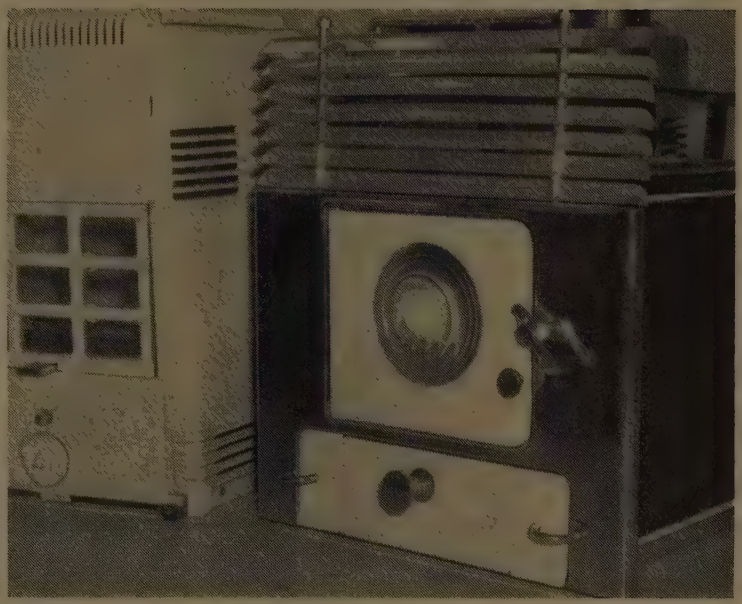
As oil is burnt (after it has vaporised) as a gas with a mixture of air, the thermal efficiency of oil-burning apparatus is generally higher than that of solid-fuel apparatus. The efficiency of well-designed oil-burning equipment may be as high at 80 per cent.; that is, 80 per cent. of the calorific value of the fuel can be made available as useful heat.

Summary of Appliances

The great advantage of heating appliances of stages 2, 3, and 4 is that they can be left burning at a reduced rate for long periods provided there is sufficient fuel in the firebox. It is possible to arrange all-night burning for stage 1 fireplaces, but not nearly so readily or as safely as can be done with stage 2 fireplaces or stage 3 and 4 stoves. In any case there is little advantage in maintaining a fire in a stage 1 fireplace unless people are near the fire, as little heat transfer by convection occurs.

Heat transfer by convection ensures that heat is carried to wherever the warmed air can circulate, so that some warmth can be maintained throughout a house during a cold night if a heating appliance which distributes its heat by convection is kept burning.

By bringing the source of heat under more control than is available with the open fire and by arranging heat transfer by convection rather than radiation, much more heat is available from the fuel consumed and the available heat is used more effectively for the purpose for which it is required—as an aid to comfortable living.



Examples of stage 4 space heaters.

Choice of Heating Appliance

Though there is not a great variation in the thermal efficiencies of the various makes of space heaters in the different stages or classes, each possesses features which, though not influencing efficiency, affect convenience of operation and appearance. When a decision has been made on the general type of heater required choice of make or model will depend more on heating capacity and appearance in relation to cost than on efficiency. As efficiency varies with the type more than with make, the claims, both for efficiency and capacity, for some makes may be extravagant. The efficiencies given for the various classes can be used as a reasonable check for any heating appliance within any class.

Fuels

Wood

The choice of fuel for space heating will depend on availability and cost. Many farms have an abundant supply of firewood, which for consumption in a space heater of any type requires only to be cut small enough to fit into the firebox.

As the calorific value of wood is about half that of good coal, about twice the weight of wood will be required for equivalent heating. However, by combining a fuel of low calorific value, such as wood, with a fuel of higher calorific value, such as coke or briquettes, a heating value can be obtained which is an average of those of the two fuels in the proportions in which they are used. This is a good practice with fuels which are difficult to ignite, such as coke, as the more readily combustible wood induces thorough ignition of the coke.

Coal

The heating qualities of coal can vary considerably—from 9250 to 14,650 B.T.U. (see Table 1)—because coal varies greatly in composition. Anthracite coal is rich in pure carbon, whereas bituminous coals contain a high percentage of hydrocarbon.

Fuels containing relatively large amounts of water have a lower calorific value than fuels containing less water, as is shown in Table 1 by the calorific values for wood and peat with 20 per cent. of moisture and the same materials dry. This difference is due to the water vapour escaping during combustion and taking its latent heat with it.

Anthracite is more difficult to ignite than bituminous coal, as it has to be raised to a fairly high temperature before it will support combustion, whereas bituminous coals at a much lower temperature give off gases, such as methane, which are readily ignited. Bituminous coals are therefore more suitable for fires in open grates and anthracite for stoves and boilers. Bituminous coals if used in stoves or boilers produce much more smoke than does anthracite.

The ash content of coal varies considerably, being as little as 2 per cent. in a good anthracite, 4 per cent. for Westport steam coal, 5 per cent. to 8 per cent. in a good bituminous coal, and as high as 20 per cent. in slack.

Coke

The coke generally available in this country is gasworks coke, which is produced when a bituminous coal is heated at the gasworks in closed retorts. The volatile gases pass out and, after purification, are collected in the gasholders for distribution. The non-volatile residue of the coal, which is dumped together with the ash, is cleaned and broken down into various sizes for domestic and industrial use. As coke burns readily with a smokeless flame when once ignited, it is excellent for space heating and can also be used in an open grate after the fire has been thoroughly set going with coal or wood.

An advantage of coke is that as usually it contains very little dust, the air passing through the fire bed will pass with less resistance and therefore a lower draught than when coals containing dust are used. The ash content of coke is usually about 5 per cent. to 8 per cent. unless it is a low-grade or breeze coke, when the ash content may be as high as 20 per cent.

Briquettes

Briquettes are manufactured fuel in which coal which is carbonised to char is compressed with a binding agent such as pitch into oval pieces. The shape and freedom from dust result in an ideal fuel with high calorific value and low ash content. The calorific value is a combination of that of the coal char and binding agent. This fuel is very suitable for burning in any apparatus.

Oil

Distillate oil, such as diesel fuel, when used in burners designed to ensure an abundant air supply and efficient vaporisation burns with a relatively smokeless flame. With highly efficient heat-transfer arrangements a large proportion of the heat generated can be made available and, as oil has a high calorific value, much more useful heat is produced than is possible from a similar weight of any solid fuel.

The great advantage of oil fuel is that heat is generated at a constant rate in proportion to the fuel supply and no firing is required, as fuel supply is automatic.

Gas

There is a great deal of sulphur in most bituminous coals and most of this passes out during the distillation of gas. Gas containing any sulphur if burnt in a room under conditions when the products of combustion are not entirely removed, has a deleterious effect on human health and on plants, fabrics, leather upholstery, the binding of books, and other materials. However, the danger of sulphur in gas has been considerably reduced owing to improved techniques at gasworks, but it is of some importance with flueless gas heaters, from which the products of combustion are discharged into the room.

The great advantage of gas heaters is that they are almost 100 per cent. efficient. Where there is a good air change their use should not be detrimental.

Gas heating is very convenient and in any comparison between it and heating with solid fuels due weight should be given the labour-saving advantages of gas.

Cost of Fuels

The criterion of domestic space heating is to obtain as much heat as possible with least cost in fuel and greatest convenience. Though initial cost, aesthetic considerations, and other factors may influence the choice of a heating appliance, the cost and availability of fuel are important aspects.

The average home of, say, 1100 sq. ft. floor area with a stud height of 8ft. 6in. contains about 9300 cub. ft. of air. If insulation is reasonably efficient, approximately 37,200 B.T.U. per hour will be required to maintain a comfortable temperature throughout the house. This amount of heat, though within the capacity of space-heating oil-burning appliances, owing to their high efficiency, is generally beyond the range of the usual domestic space heaters which burn solid fuel. For this reason the home owner usually compromises by heating part of the house comfortably and probably taking the chill off the remainder by warm-air circulation.

Such a compromise can be made in the average New Zealand home by providing a stage 3 heater which, if required, can be used as an open fire and the capacity of which is given as 5000 cub. ft. of space effectively warmed. The effective heat available from a space heater with a heating rating of 5000 cub. ft. is approximately twice its volume rating in B.T.U., which in this case is 10,000 B.T.U. per hour. On this basis, and allowing a thermal efficiency of 60 per cent. for a stage 3 heater, a comparison of fuel costs can be made.

Assuming that a small fire of about 7lb. is started and combustion controlled to give the required heat output of 10,000 B.T.U. per hour, the following would be the quantities of various fuels required to produce this heat output when due allowance is made for thermal efficiency and calorific value:—

	lb.
Anthracite coal	1.13
Bituminous coal	1.28
Coke	1.38
Briquettes	1.22
Wood (20 per cent. moisture)	2.97

The consumption of oil fuel to produce the same heat with an oil-fired appliance having an efficiency of 80 per cent. would be 0.63 pint.

The cost of fuel to produce 10,000 B.T.U. per hour with a stage 3 heater to warm 5000 cub. ft. of space effectively would be as follows:—

Fuel	*Cost per lb. d.	Cost of fuel for 10,000 B.T.U. per hour d.
Anthracite coal	2.05	2.316
Bituminous coal	0.88	1.126
Gas coke	1.0	1.380
Briquettes	1.66	2.025
Wood	1.1	3.267
Oil, (per pint)	2.31	1.455

Comparative costs with gas or electricity as the source of heat would be:—

Gas (per cub. ft.)	0.12	2.664
Electricity (per unit)	0.7	2.044

* Costs based on those in Wellington.

TABLE 1—CALORIFIC VALUE OF FUELS

	Approximate calorific value B.T.U. per lb.
Solid	
Coal, anthracite	14,650
Coal, bituminous	13,000
Coal, poor quality	9,250
Coke, gas	12,000
Coke, breeze	10,000
Coke, furnace	13,500
Briquettes	13,500
Wood, 20 per cent. moisture	5,600
Wood, kiln dried	8,000
Peat, 20 per cent. moisture	6,500
Peat, kiln dried	10,000
Charcoal from wood, dry	13,000
Charcoal from peat, dry	11,600
Liquid	
Kerosene	20,050
Diesel fuel	19,760
Light fuel oil	19,260
Heavy fuel oil	18,900
Gas	B.T.U. per cub. ft.
Coal gas	450
Liquid petroleum gas	3,333

Though in a city area such as Wellington, coal and coke are the cheapest fuels, oil is little dearer. In country districts wood probably would be the least expensive.

Gas and electricity are both expensive for space heating, but against the cost must be weighed the labour saving and convenience resulting from their use.

Heat Transmission

The heat-transmission value for glass or flat sheets of thin asbestos or iron is generally taken as 1 and for other materials commonly used may be taken at the following figures:—

TABLE 2—HEAT-TRANSMISSION VALUE OF MATERIALS

Walls	
4½in. brickwork	0.59
9in. brickwork	0.39
13½in. brickwork	0.29
18in. brickwork	0.23
(When walls are plastered these figures are 10 per cent. less).	
11in. cavity walls	0.27
4in. concrete walls	0.75
6in. concrete walls	0.61
8in. concrete walls	0.52
10in. concrete walls	0.45
Corrugated iron	1.5
Corrugated asbestos	1.4
Walls with Some Degree of Insulation	
Brick with 1in. cork and plaster:	
4½in. brick	0.19
22½in. brick	0.12
Concrete with 1in. cork and plaster:	
4in. concrete	0.21
12in. concrete	0.17
Corrugated iron or asbestos lined with ¾in. wood	0.41
Lined with plaster board	0.53
Lined with ¾in. fibre board	0.31
Doors and Windows	
Wooden doors	0.5
Glazing	1.0
Double glazing	0.5
Floors	
Wooden floor on joists with plaster ceiling	0.27
6in. concrete floor with screed	0.48
6in. concrete floor with wood floor finish	0.33
Roofs	
Corrugated iron	1.5
Corrugated asbestos	1.4
Treated metal sheets	0.9
Tiles or slates unlined	1.5
Tiles or slates on sarking with felt or paper	0.56
Tiles or slates unlined with plaster ceiling	0.56
Tiles or slates over sarking and felt with plaster ceiling	0.32
Floors Resting on Ground	
6in. concrete with hard aggregate (such as granite chips) finish	0.5
6in. concrete with wood blocks or boards on fillets	0.35

The above figures help calculation of the amount of heat required in B.T.U. to balance the heat loss from a building to the outside when the weather is cold.

Reference

"Heating and Ventilating", by Oscar Faber (E. and F. N. Spon, London, 1948).

Ways with Pork

By DAPHNE EILERS,
formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

PORK has been used for food from very early times. One of Charles Lamb's best-known essays tells the story of the small Chinese boy who discovered how delicious roast pork could be. Fortunately modern methods of cooking pork are less expensive and do not involve burning down the entire house to achieve the correct degree of cooking.

GOOD pork has greyish-pink flesh which is smooth and dry to the touch and fat which is firm and white. The leg and loin are the most suitable cuts for roasting, though the shoulder and hand without the shank are sometimes used, usually boned and rolled. Loin chops and fillets may be grilled or fried if care is taken to cook them thoroughly. Rib-end loin, shoulder or fore loin, and neck end are best pot roasted or braised, and these too may be used as well as the leg, belly, hand, or head for boiling and stewing.

Whatever cookery method is used it is important to be sure that the pork is thoroughly cooked. Though beef and mutton may be eaten underdone, pork is most unpalatable if it is not fully cooked. For best results it should be cooked slowly, 30 to 35 minutes at 350 degrees F. being the time allowed per pound of meat.

HEADING PHOTOGRAPH: Roast loin of pork. Inset—Side of pork, showing various cuts. 1—Leg. 2—Belly. 3—Hand. 4—Chump-end loin or fillet. 5—Middle loin. 6—Rib-end loin. 7—Shoulder or fore loin. 8—Neck end. 9—Cheek. Some terms used in the meat trade have only a local usage, but the above are common in New Zealand.

Roasting

For crisp crackling the skin should be scored across in lines ¼in. apart. The knife blade should not penetrate the fat below the skin. Pepper and

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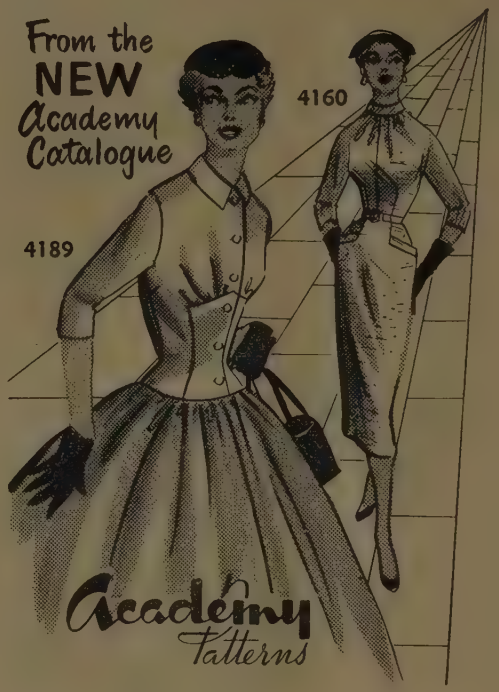

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salt should then be rubbed into the skin and into the cuts. The pork is then put out skin side up in the roasting pan and placed in a hot oven (450 to 500 degrees F.) for 10 to 15 minutes. The temperature should then be lowered to 350 degrees F. and cooking continued for the required time. If the crackling is not sufficiently crisp when the meat is cooked, the heat may be increased for the last few minutes just before serving. The crackling is also improved if it is basted during cooking.

Roast Stuffed Pork

Loin or leg of pork should be used for roasting. The leg must be boned to give space for the stuffing. The loin can be boned and tied in a roll or the meat may be separated slightly from the bones to form a pocket for the stuffing. The pocket can be fastened to hold the stuffing inside.

Sage and Onion Stuffing

- 1 medium-sized onion
- 2 fresh sage leaves or ½ teaspoon of dried sage
- ½ tablespoon of melted butter
- ½ cup of breadcrumbs
- ½ teaspoon of salt
- Shake of pepper

Peel the onion and boil it for 5 minutes. Dip the sage leaves in the boiling water for a minute. Chop the onion and the sage and combine all the ingredients.

If desired, the stuffing may be rolled in greaseproof paper and cooked separately.

Savoury Roast Pork

To give roast pork a savoury flavour the skin should be cut as described and the following mixture rubbed well into the pork.

- ½ teaspoon of powdered sage
- ½ teaspoon of dry mustard
- ½ teaspoon of salt
- ½ teaspoon of pepper
- 1 finely chopped onion

Roast Pork Loin with Apple Glaze

- 1 tablespoon of flour
- 1 teaspoon of dry mustard
- 1 teaspoon of salt
- ¼ teaspoon of pepper
- Loin of pork (about 4lb., boned and rolled)
- 2 cups of sweetened apple puree
- ¼ cup of brown sugar
- ¼ teaspoon of ground cinnamon
- ¼ teaspoon of ground cloves

Mix the flour, mustard, salt, and pepper together and rub the roast with the mixture. Place the loin, fat side up, in the roasting dish and roast it in a slow oven (325 degrees F.) for 2½ to 2¾ hours. An hour before the end of cooking time remove the roast from the oven and spread the meat with the apple, sugar, and spice mixture. Return the roast to the oven until it is done.

Roast Sucking Pig

- 1 sucking pig
- Sage and onion stuffing (see recipe above)
- Salt
- 2oz. of butter
- Hot water

Wipe the cleaned pig inside and out with a damp cloth and dry it thoroughly. Stuff the pig loosely with sage and onion stuffing and sew it up carefully. Place the pig in the roasting pan in a kneeling position with the hind legs tied together. Sprinkle it with a little salt and place the butter in the pan with about 1 cup of hot water. Place a sheet of greased paper over the top of the pig. Roast the pig gently in a moderate oven (325 to 350 degrees F.) for about 3½ hours. Baste the meat frequently with the water and butter mixture in the pan, as otherwise the skin will split. Half an hour before serving remove the greased paper to allow the crackling to crisp.

The sucking pig should be served in its kneeling position on a large meat platter. A polished red-skinned apple should be placed in the mouth and red cherries or crab apples put into the eye sockets. As further garnish pineapple slices or orange slices with parsley may be used.

Sauted pork chops served with hot pineapple slices.

Sauted Pork Chops

Rib, loin, or shoulder chops can be sauted. The chops should be ¾in. to 1in. thick. Sear the chops quickly on both sides in a hot frying pan. Pour off the excess fat, sprinkle pepper and salt over the chops, and cover the pan with a lid. Lower the heat and continue cooking the chops slowly for a further 20 to 25 minutes, turning them at intervals. When the chops are tender remove them from the pan and keep them hot while sliced apple, pineapple, or tomato is sauted in the remaining fat. Gravy can be prepared from the drippings.

Casserole of Pork Chops

- 6 pork chops
- 1 teaspoon of salt
- Shake of pepper
- 1 cup of water
- 4 medium-sized cooking apples
- 1 teaspoon of Worcestershire sauce
- 4 bacon slices (lightly fried)
- 2 medium-sized onions

(6 servings)

Wipe the chops and trim off some of the excess fat. Brown them on both sides in a frying pan before placing them in a casserole dish. Peel and slice the apples and onions and place them in layers on top of the chops. Sprinkle them with the pepper and salt and pour the water and sauce into the casserole. Place the strips of lightly fried bacon on top of the mixture in the casserole and cover and bake it at 375 degrees F. for about 1½ hours.

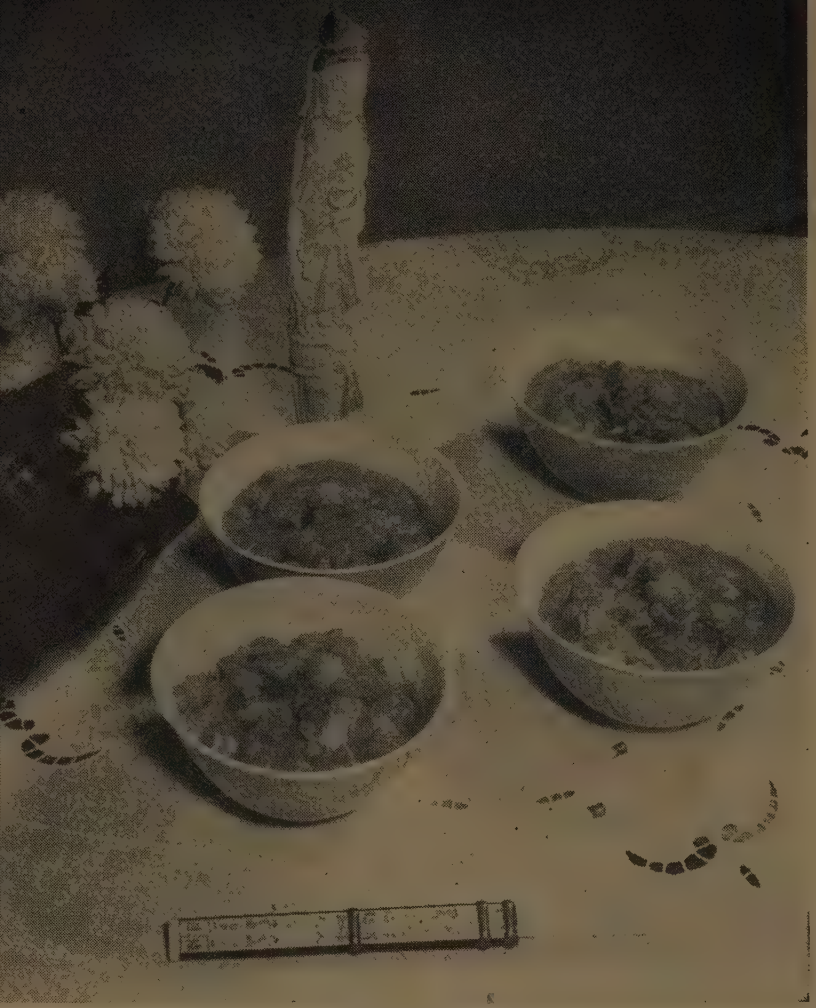
Variation

A variation of the casserole can be made with 1 small tin of pineapple and 1 tablespoon of soya bean sauce. The pineapple juice and the soya bean sauce are substituted for the water and Worcestershire sauce, and the pineapple cubes or slices are used in place of the apple.

Pot Roast of Pork

- 3lb. to 4lb. loin of pork
- ½lb. of carrots
- 1 small cabbage
- 2 large onions
- 2 white turnips
- Leaf of sage
- Salt and pepper
- 1 pint of stock

Sear the roast in a hot pan, turning the meat to brown it on all sides.



Pork chow mein.

Wash and prepare the vegetables, cutting the carrots into strips, the cabbage into small sections, the turnips into quarters, and the onions into slices. Put the vegetables in with the meat and add the sage, salt, pepper, and stock. (The stock can be made from pigs' trotters or from the bones of the loin.) Cover the pan and simmer the roast gently for 2½ to 3 hours. Unsweetened baked apples can be served with this dish.

Pork Chops with Stuffing

6 loin chops
1½ teaspoons of salt
¼ teaspoon of paprika
1½ cups of scalded milk
1½ cups of sage and onion stuffing (see recipe on page 305)

Brown the chops on both sides in a frying pan and then place them in a casserole. Season them with the salt and paprika and pour the hot milk over them. Cover the casserole and bake the chops for 45 minutes in a moderate oven (350 degrees F.). Place the stuffing on top of the chops and continue cooking the dish uncovered for a further ½ hour. The stuffing should be lightly browned and the milk absorbed by the chops.

Left-over Pork Recipes

Pork Chow Mein

2 tablespoons of butter
2 cups of cooked cubes of pork
2 cups of sliced celery
1½ cups of sliced onions
Shake of pepper
2 cups of stock (or hot water and bouillon cubes)
2 cups of mixed vegetables (cut finely)
½ cup of cooked mushrooms (if desired)
2 tablespoons of cornflour
2 tablespoons of soya bean sauce
2 cups of hot, cooked rice or noodles

(4 to 6 servings)

Heat the butter in a heavy frying pan or saucepan and saute the pork cubes until they are lightly browned; add the celery, onions, mixed vegetables, pepper, and stock. Cover and cook the mixture for 10 to 15 minutes and then add the cooked mushrooms and soya bean sauce. Thicken the mixture with the cornflour and simmer it for a further 2 minutes, stirring it all the time. Serve it on the rice or noodles.

Sweet-sour Pork

3 tablespoons of butter
½ sliced green pepper
½ cup of chopped onion
1 level tablespoon of cornflour
1 small tin of crushed pineapple (drained)
2 tablespoons of vinegar
1 tablespoon of soya bean sauce
2 sliced cooked kumaras
4 ½in. slices of cooked pork

(4 servings)

Pre-heat a broiler grill. Heat the butter in a frying pan and saute the sliced green pepper and onion in it; add the cornflour mixed with a little pineapple juice and then add the crushed pineapple. Simmer the mixture gently for 5 minutes, stirring it all the time. Add the vinegar and soya bean sauce. Arrange the pork slices and kumara slices in a shallow, open pan and pour the sauce over the meat. Place the mixture under the griller or in the top of the heated oven for 5 to 10 minutes until it is browned and heated well.

Pork Cheese

2lb. of cold roast pork
½ teaspoon of salt
Shake of pepper
4 small sage leaves
1 dessertspoon of chopped parsley
½ teaspoon of minced lemon peel
1 pinch of nutmeg
1 pinch of mace
Good rich gravy

Cut the pork finely and allow 4oz. of fat to each lb. of lean meat. Season the meat with the pepper and salt, chop the sage finely, and mix all the ingredients, except the gravy, very thoroughly. Put the meat mixture into a greased mould and pour the gravy on top to almost fill the mould. Bake the dish in a moderate oven for about 1½ hours. When the cheese is cold turn it out of the mould. Serve it with salads and use it for sandwich filling and for savouries.

Pork Loaf

2 eggs (beaten)
½ cup of milk
1½ cups of stale breadcrumbs
3 cups of minced cooked pork
2 medium-sized apples
1 medium-sized onion
½ teaspoon of salt
Shake of pepper
Pinch of thyme

(6 to 8 servings)

Mix the eggs, milk, and breadcrumbs together and allow them to stand until the breadcrumbs have absorbed the liquid. Peel, core, and mince the apples and peel and mince the onion. Combine the pork, apples, and onions and stir the breadcrumbs and seasonings into the meat mixture. When all the ingredients are well mixed together pack them into a greased loaf tin. Bake the loaf for 30 to 35 minutes in a moderate oven (350 degrees F.).

Flowers from Bulbs, Corms, and Tubers

FLOWERS from bulbs, corms, and tubers generally bring thoughts of spring, as many of these types of plants then come into bloom. But others flower later in the season; in fact, different types flower at all times of the year. In the following article K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch, discusses their place in the flower garden and outlines their general requirements. Notes on flower garden work in April are by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.

MOST plants grown from bulbs, corms, and tubers are very showy, but because they have a fairly short flowering season many of them are best suited for growing among other plants.

The Mixed Border

The mixed border offers such conditions. There the bulbs can be planted among perennials and annuals and full advantage taken of the flowering period of each plant.

Planning of the border should ensure that the display will continue as long as possible. Bulbs should be placed so that they will be able to grow without undue competition until flowering time, but once the flowers are spent the border will look more attractive if the dying foliage is covered, or partly covered, by other plants.

Some plants, such as lilies, prefer a cool root run, though they will tolerate full sun on the foliage and flowers. Often a mulch is placed over such bulbs, but cover planting with sprawling subjects looks better and serves the same purpose, provided they are not allowed to draw soil moisture to the detriment of the bulbous plants.

Bedding Displays

Tulips, hyacinths, and gladiolus are sometimes used for bedding display, but because they cannot be lifted when flowering is finished, they are not fully satisfactory for this purpose. Anemone and ranunculus are more suitable; they can be disposed of at any time if the old tubers are not being kept for the following year.

When bulbs, corms, and tubers are used for formal bedding a good, even line should be used to assure a satisfactory display. Best results are usually obtained with one variety only; if several are used in one bed, variation in flowering time may occur, and the bed should be planned so that any late flowering group will not upset the display.

Rock Garden

For the smallest bulbs the rock garden is the ideal position, because there they can be left without disturbance and consequent risk of being lost. Their size is also more in proportion to neighbouring plants than it would be in a mixed border. In the rock garden good drainage, which is of major importance for these small gems, is usually assured. Most of them can be left for a number of years and lifted only when they become too crowded.

Naturalising Bulbs

In larger gardens bulbs can be planted in existing lawns. Narcissus

Heading photograph by Willski.

EARLY MORNINGS CALL FOR...

MARATHON GUMBOOTS

For the man whose work demands that he be out and about all hours of the day or night . . . wet or fine, in mud, grass or scrub . . . there is no better Gumboot than MARATHON. Farmers, Sportsmen and all Outdoormen can rely on Marathon for comfort and protection, wherever they are, whatever the going.

MARATHON Gumboots are built to take a beating in their stride.

"Selwyn"
Men's Knee
Gumboot

"Buller"
7½" Laced
Ankle Boot

"Perth" Knee
Gumboot

MARATHON GUMBOOTS *by Skellerup*

is the type most frequently seen growing in this manner, but many others can be used. A bluebell dell is, for example, being established in a Christchurch park.

When bulbs are naturalised in a lawn the grass should not be cut until flowering is finished, and even then mowing should be delayed as long as possible to enable the bulbs to build up a food supply for next season's flowering before the foliage is removed. The bulbs are left in the ground permanently and while the combination of all factors in relation to their growth does not produce show blooms, a delightful display can be achieved.

Cut Flowers

Cutting of flowers for indoor decoration is less of a problem in a mixed border than in a formal bed, where the balance can be upset if flowers are removed. If many cut flowers are required, it is preferable to grow them in a reserve area. A section of the vegetable garden is the favourite position for many growers of show blooms. Apart from growing the plants in a more secluded situation the vegetable garden frequently offers better scope for crop rotation than the flower garden; a point which should always be considered.

The manner in which the various subjects can be used is detailed on the chart on page 310.

Soil

Bulbs, corms, and tuberous-rooted plants will grow in ordinary garden soil, provided drainage is satisfactory. Only on very heavy or sandy soils should much soil improvement be necessary (see article in "The Journal", October 1956).

Good drainage is essential for healthy and satisfactory development. Roots will not grow properly in wet ground and losses may occur through rots.

The soil should always be well cultivated and contain a good supply of humus, but bulbs should never be planted near decaying organic matter, and rich manure should be avoided.

If possible, a position should be selected which was heavily manured for a previous crop.

Few bulbs like acid soil conditions and regular liming should be done.

The safest fertiliser to use on this type of plant is bonedust, which contains phosphate and a small percentage of nitrogen. These ingredients become available slowly, and if a dressing of up to 4oz. per sq. yd. is applied at planting time, the fertiliser will prove beneficial when the plants have become well rooted.

Position and Location

Some bulbs, corms, and tuberous-rooted plants do best when growing in full sun and for most good light is essential until flowering time or they will tend to become drawn. Diffused light, as found under partly overhanging trees, is generally satisfactory, but the taller subjects may grow toward the full light.

Early spring flowering bulbs look very attractive growing under deciduous trees, where conditions are ideal, as they flower before the trees come into full foliage.

The best situations always allow free circulation of air among the plants, but shelter should be provided to break strong winds.

Some bulbs, especially tulips, narcissus, and hyacinths, are not always satisfactory when growing in warm soils. They are sometimes termed cold climate bulbs and usually do best when growing in colder parts of the country. They should be planted in early autumn and have a long period for root development before the tops begin growing.

When these bulbs are planted in a warm and possibly dry soil roots develop slowly and top growth may take place before much nourishment can be taken in by the new roots. This is detrimental to the bulbs and if drying of the foliage is accelerated by the same climatic factors, the bulbs will not develop properly for the next season, and a gradual deterioration will take place from year to year.

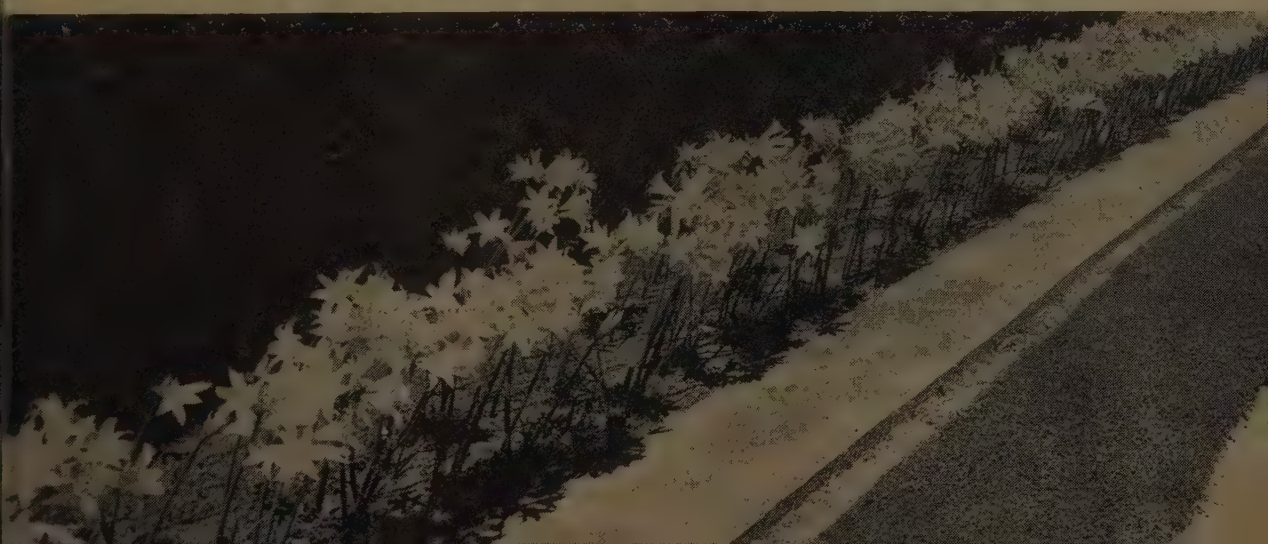
There are other bulbs which demand warm and dry soil conditions. Among them are nerines, amaryllis, and lachenalias. A baking in the sun appears to benefit this type, as without it they may become erratic in their flowering. These are called warm climate bulbs.

The most suitable position and location for the various subjects can be seen on the chart.

Lifting and Planting

The most suitable times for lifting and planting differ; some should be lifted as soon as the top growth has dried off and replanted as soon as possible. Among these are the lilies, the roots of which never dry off or become dormant. Many of the cold climate bulbs are best lifted every year when the foliage has died down completely, stored for summer, and planted again in autumn. Gladiolus, however, is lifted before the foliage dries right off and is stored for winter.

Planting depth and distances vary, but planting should never be too deep. Most bulbs and corms which naturally grow deep in the soil have contractile roots which will pull them down, and if they are left undisturbed for a number of years, they will find their



▼ Belladonna lilies make a good display in late summer. R. W. Orr photo.

Botanical name	Common name	Planting time				Depth	Flowering period				Height			Lifting period				Soil			Situation			Hardiness				Uses			
		Spring	Summer	Autumn	Winter	Soil cover (in.)	Spring	Summer	Autumn	Winter	Up to 1ft.	1 to 3ft.	3ft. and more	Spring	Summer	Autumn	Winter	Average	Light	Moist	Average	Sun	Shade	Cold climate	Hardy	Half-hardy	Tender	Mixed border	Bedding	Rock garden	Naturalising
Agapanthus sp.				☆	☆	3		☆				☆	☆			☆	☆	☆			☆	☆	☆			☆		☆			☆
Alstroemeria sp.	Peruvian lily			☆		2		☆				☆				☆		☆	☆		☆		☆			☆		☆			☆
Amaryllis belladonna	Belladonna lily		☆			0				☆		☆			☆			☆	☆		☆		☆			☆		☆			☆
Anemone	Wind flower			☆		2	☆			☆	☆				☆	☆		☆	☆		☆	☆		☆	☆			☆	☆	☆	☆
Babiana sp.	Baboon flower			☆		6	☆				☆					☆		☆	☆		☆	☆			☆			☆			☆
Begonia tuberhybrida	Tuberous begonia	☆				1		☆	☆		☆					☆		☆			☆		☆				☆	☆			
Calochortus sp.	Mariposa lily			☆		2	☆				☆	☆				☆			☆		☆				☆			☆			☆
Camassia sp.	Bear grass			☆		4	☆					☆				☆		☆		☆	☆				☆			☆			☆
Canna sp.		☆				3		☆	☆			☆	☆	☆				☆		☆		☆				☆		☆	☆		
Chionodoxa sp.	Glory of the snow			☆		3	☆				☆					☆		☆			☆		☆	☆	☆			☆		☆	☆
Olivia sp.		☆				0	-	☆				☆		☆				☆					☆				☆				
Colchicum sp.	Autumn crocus		☆			1			☆		☆				☆			☆			☆	☆	☆	☆	☆			☆		☆	☆
Convallaria majalis	Lily of the valley				☆	1	☆				☆						☆	☆		☆	☆		☆	☆	☆			☆		☆	☆
Crinum sp.	Veld lily	☆				1		☆				☆		☆				☆			☆				☆			☆		☆	☆
Crocosma aurea	Falling star			☆	☆	3		☆				☆				☆		☆	☆		☆				☆			☆		☆	☆
Crocus sp.				☆		2	☆				☆					☆		☆			☆				☆			☆		☆	☆
Cyclamen sp.				☆		0	☆			☆						☆		☆		☆	☆		☆	☆	☆			☆		☆	☆
Dahlia		☆				2		☆	☆		☆			☆		☆		☆			☆				☆			☆	☆		
Eranthis sp.	Winter aconite			☆		3	☆			☆	☆					☆		☆			☆		☆	☆	☆			☆		☆	☆
Freesia			☆	☆		2	☆				☆				☆			☆	☆		☆	☆			☆			☆		☆	☆
Fritillaria sp.				☆		3	☆					☆				☆		☆			☆				☆			☆		☆	☆
Galanthus sp.	Snowdrop		☆	☆		2	☆				☆				☆	☆		☆	☆		☆		☆	☆	☆			☆		☆	☆
Galtonia candicans	Summer hyacinth				☆	3		☆				☆	☆				☆	☆			☆				☆			☆			
Gladiolus		☆				4		☆				☆	☆			☆		☆			☆	☆			☆			☆	☆		
Hemerocallis sp.	Day lily				☆	3		☆				☆	☆				☆	☆	☆	☆	☆	☆			☆			☆			☆
Hippeastrum				☆		0	☆					☆				☆		☆			☆				☆			☆		☆	☆
Hyacinthus	Hyacinth			☆		4	☆				☆					☆		☆			☆			☆	☆			☆	☆	☆	☆
Hymenocallis sp.	Basket flower				☆	2	☆					☆					☆	☆			☆				☆			☆			
Iris germanica	Bearded iris		☆			3	☆			☆		☆				☆		☆	☆			☆			☆			☆		☆	☆
Iris innominata				☆		3	☆					☆					☆	☆			☆				☆			☆		☆	☆
Iris laevigata (kaempferi)	Japanese iris				☆	2		☆				☆					☆				☆				☆			☆			☆
Iris siberica	Siberian iris				☆	1		☆				☆	☆				☆			☆	☆				☆			☆			☆
Iris tingitana				☆		2	☆					☆				☆	☆	☆			☆				☆			☆			☆
Iris unguicularis	*Iris stylosa*	☆				2				☆	☆			☆		☆					☆	☆	☆		☆			☆		☆	☆
Iris xiphioides	English iris			☆		3		☆				☆				☆					☆				☆			☆			☆
Iris xiphium	Spanish iris			☆		3	☆					☆				☆	☆				☆				☆			☆			☆
Iris xiphium hybridum	Dutch iris			☆		3	☆					☆				☆	☆				☆				☆			☆			☆
Ixia			☆			2	☆					☆				☆		☆	☆			☆			☆			☆	☆		
Lachenalia sp.	Cape cowslip		☆			1	☆			☆	☆					☆		☆			☆				☆			☆		☆	☆
Leucocoryne sp.				☆		2	☆					☆				☆		☆	☆		☆	☆				☆		☆			
Leucojum sp.	Snowflake		☆			2	☆				☆					☆					☆		☆		☆			☆			☆
Lilium sp.	Lily			☆		3-5		☆				☆	☆			☆					☆				☆			☆			☆
Lycoris sp.	Spider lily		☆			3			☆			☆						☆				☆			☆			☆			☆
Muscari sp.	Grape hyacinth		☆			2	☆				☆					☆		☆			☆				☆			☆			☆
Narcissus			☆	☆		4	☆				☆					☆		☆			☆	☆	☆	☆	☆			☆		☆	☆
Nerine	Guernsey or Spider lily		☆			0				☆	☆	☆				☆		☆	☆			☆				☆		☆		☆	☆
Ornithogalum sp.	Star of Bethlehem			☆		3	☆				☆	☆					☆	☆			☆	☆			☆			☆		☆	☆
Polianthes tuberosa	Tuberose				☆	2		☆				☆					☆	☆			☆	☆					☆	☆		☆	☆
Polygonatum sp.	Solomon's seal				☆	1	☆					☆					☆	☆			☆	☆			☆			☆		☆	☆
Ranunculus				☆		2	☆					☆				☆				☆	☆	☆				☆		☆	☆	☆	
Scilla sp.	Bluebell and others			☆		2	☆					☆				☆		☆			☆		☆		☆			☆		☆	☆
Sparaxis sp.	Wandflower		☆	☆		2	☆					☆				☆		☆			☆		☆		☆			☆		☆	☆
Sprekelia formosissima	Jacobean lily	☆			☆	3		☆				☆				☆	☆	☆			☆	☆			☆			☆		☆	☆
Sternbergia lutea	Yellow autumn crocus		☆			3				☆		☆				☆		☆	☆			☆			☆			☆		☆	☆
Tigridia sp.	Tiger flower	☆				3			☆			☆					☆	☆	☆		☆		☆		☆			☆		☆	☆
Tritonia sp.	Montbretia				☆	2			☆			☆					☆	☆	☆		☆	☆			☆			☆		☆	☆
Tulipa	Tulip			☆		4	☆					☆					☆	☆			☆		☆		☆			☆		☆	☆
Valotta purpurea	Scarborough lily				☆	0		☆				☆					☆	☆			☆		☆	☆	☆			☆	☆	☆	☆
Veltheimia viridifolia	Giant lachenalia			☆		1	☆					☆				☆		☆	☆			☆			☆			☆		☆	
Watsonia				☆		4												☆			☆		☆					☆			
Zantedeschia sp.	Arum lily or calla			☆	☆	2	☆	☆		☆	☆	☆		☆		☆	☆	☆		☆	☆		☆		☆			☆		☆	☆

own level. It is therefore desirable to note the depth at lifting time and plant a little less deeply, especially the smaller bulbs.

For informal planting it is best to group the various plants in clumps or drifts. They will then be more conspicuous and attractive than if they are scattered individually. Sufficient spacing should be allowed so that each can develop both their roots and foliage properly.

A few subjects, mainly tulips and gladiolus, are best lifted every year, but most can be left for a number of years. When they show deterioration of the flowers they should be lifted and spaced, but until then many will flower much better if left, even if they appear to be crowded. This is especially so with most warm climate bulbs.

Storage

Storage of bulbs, corms, and tubers is always a problem for the home gardener, as the quantities to be stored are generally so small that the construction of special facilities is not warranted. It is therefore best to outline the principles of storage so that the most suitable position can be chosen.

Drying and cleaning, including the destruction of any material showing disease, should be completed before storage.

The storage space should be dry and have free ventilation without being draughty.

An even temperature should be maintained during storage, without excessive heat in summer or frost in winter.

To prevent infestation by insect pests during storage a dusting with

lindane (2 per cent.) can be carried out and a dusting with thiram (5 per cent.) will assist in preventing spread of fungous diseases.

Disposal of Bulbs

Unhealthy bulbs should not be placed on the compost heap. They should be burnt, even if this may cause some inconvenience. Various fungous and bacterial diseases can otherwise be perpetuated, and rots, which to the amateur appear to be caused by a disease, may be secondary to infestation by insects, for example, bulb fly. The grubs may still be present and if the bulbs are not destroyed, their development will continue.

Some bulbs multiply very rapidly and in a small garden they may become too numerous. If they cannot be disposed of for garden purposes, they should be destroyed, and not dumped indiscriminately. They may otherwise establish themselves and become undesirable weeds, as have several of the bog iris, which are found to block up streams in some parts of the country, and cape tulip (*Homeria collina*), which is very poisonous both to man and animals.

Iris

Some irises have bulbs, some rhizomes, and others fleshy, fibrous roots. Their requirements differ greatly and details not mentioned in the chart are as follows:—

I. tingitana is the earliest of its type. The blue flowers come in late winter or early spring. Unfortunately it is a shy bloomer and not reliable, even when it grows in the best position. For good flowering the bulbs require extreme temperatures in both winter and summer. They should therefore not be planted deeply and they should be planted only where the soil becomes hot and dry in summer.

Dutch irises, the most popular in the bulbous group, are available in white, yellow, and blue shades. They are much more reliable than *I. tingitana* and generally are preferable, especially in districts with high summer rainfall.

Spanish irises are somewhat smaller than Dutch irises and flower a little later in spring. They have bulbs and are available in blue, white, yellow, and bronze shades.

English irises are the last of the bulbous irises to come into flower, in December or January according to locality. They are found in various colours, but blue shades are most commonly available. They are not as easy to handle as Dutch iris and should be replanted as soon as possible after lifting in late summer.

Bearded irises are the rhizomatous members of the genus. They flower from late winter until early summer. There is now a great variety of colours available and they are very picturesque. When required, transplanting should be done soon after flowering to assure flower formation the following year.

Japanese irises have fleshy, fibrous roots. They dislike lime and dry soil conditions. They are difficult to transplant, and there are often losses after transplanting. When they do well they make a grand display. Many colours are available.

I. siberica is also a bog iris, but much easier to deal with than Japanese iris. It is available in blue and purple shades and in white.

I. innominata is a small fibrous-rooted iris which has become very popular in recent years. It grows 15in. to 18in. high and is available in many colours. Old plants are difficult to split up, but if division is contemplated, it is most likely to meet with success when done in autumn. Better results are generally obtained if new plants are raised from seed, which germinates readily.

I. stylosa is a very accommodating small iris; perhaps it is so popular because it flowers in winter. It will grow in most soils and under varied conditions. It appears to flower best when given least attention, but drainage should be perfect.

Lilies

There are many different lilies, and growing conditions vary in their natural habitats. It is therefore possible to give only an outline of the conditions which suit most of them.

Lilies require adequate moisture during the growing season, but drainage must be perfect. The soil should be rich in organic material; if this is lacking, it should be supplied before planting by the addition of well-rotted compost or leafmould. Rich manure should be used very sparingly and never close to the bulbs.

Because the rooting habits of lilies differ, the depth of planting must be adjusted accordingly. Stem-rooting types should not be planted deeper than 5in. or 6in. and those rooting from the base only should be planted 3in. to 4in. deep. An exception is *L. candidum*, which should be planted just below the surface.

Transplanting should be done only when definitely required, but when necessary it should be carried out as soon as the tops have dried off after flowering. The bulbs and roots are never dormant and care should be taken that they do not dry out. Imported bulbs of *L. auratum* often flower the first year, but fail to make further growth, because the roots had dried off before they arrived and new ones did not develop.

Upper—The dainty petticoat narcissus is a favourite for the border and rock garden. Lower—Lachenalias are always showy in the spring border and in the rock garden. Elliott photos.

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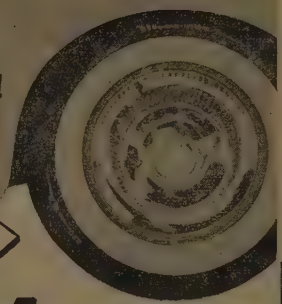

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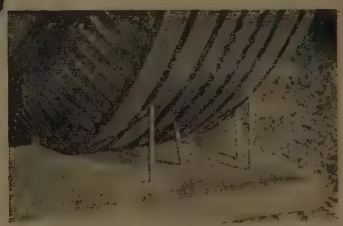

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USE TRAINS FOR TRANSPORT

NEW ZEALAND RAILWAYS

Gladiolus

Gladioli are among the most popular plants for summer display and are available in many colours, types, and sizes. They can be grown without much trouble and are very suitable for filling gaps in a border.

Planting can be carried out as soon as the soil warms up in spring, or can be delayed until later in the season. Flowering will take place 80 to 110 days after planting, according to the variety and temperatures during growth.

The corms should be lifted every year; the best time is some 6 weeks after flowering, or even sooner when flowering has taken place late in the season.

Anemones

There are a number of different species of anemones available, but the ones commonly used in the flower garden are St. Brigid's, which are available in mixed colours and in named varieties.

They do not like acid soil conditions and lime should generally be applied before planting.

For winter flowering, anemones should be planted in midsummer, so that the plants are fully developed before cold weather sets in.

It is not always wise to plant "top" size tubers. If large tubers are planted early in the season (December), they may develop too much foliage to the detriment of the flowers and the plants as a whole. When smaller tubers are used for early planting their flowering is generally more profuse and they are not so subject to disease.

For spring flowering the tubers should be planted late in autumn and benefit will then be derived from the use of larger grade tubers.

When anemones are planted early they should not be planted too close, a mistake often made. Plants 12in. to 15in. across are not uncommon, and if the soil is in good heart, they should be given at least that spacing. For late planting they can be planted closer.

Narcissus

The main points in growing narcissus have been dealt with. It is, however, confusing for home gardeners to study trade catalogues and show schedules without some knowledge of the classification which distinguishes the different types and in some cases their colouring.

The following is the classification used:—

Division 1 (trumpet narcissi): One flower to a stem, trumpet or corona as long as or longer than perianth segments. There are 4 subdivisions as follows:—

(a) Perianth coloured; corona coloured, not paler than the perianth.

(b) Perianth white; corona coloured.

(c) Perianth white; corona whiter, not paler than perianth.

(d) Any colour combination not falling into (a), (b), or (c).

Division 2 (large-cupped narcissi): One flower to a stem; cup or corona more than one-third, but less than equal to, the length of the perianth segments.

Four subdivisions corresponding with (a), (b), (c), and (d) in division 1.

Division 3 (small-cupped narcissi): One flower to a stem; cup or corona not more than one-third of the length of the perianth segments.

Four subdivisions corresponding with (a), (b), (c), and (d) in divisions 1 and 2.

Division 4 (double narcissi): Flowers double.

Division 5 (triandrus narcissi): Characteristics of *N. triandrus* clearly evident.

(a) Cup or corona not less than two-thirds the length of the perianth segments.

(b) Cup or corona less than two-thirds the length of the perianth segments.

Division 6 (cyclamineus narcissi): Characteristics of *N. cyclamineus* clearly evident.

Two subdivisions corresponding with those of division 5.

Division 7 (jonquilla narcissi): Characteristics of *N. jonquilla* group clearly evident.

Two subdivisions corresponding with those of divisions 5 and 6.

Division 8 (tazetta narcissi): Characteristics of any of the *N. tazetta* group clearly evident.

Division 9 (poeticus narcissi): Characteristics of the *N. poeticus* group without admixture of any other.

Division 10 (species and wild forms and hybrids): All species and wild or reputed wild forms and hybrids.

Division 11 (miscellaneous narcissi): All narcissi not falling into any of the foregoing divisions.

Dahlias

Though dahlias are tuberous rooted, their habit is more like herbaceous perennials with which they were grouped in an article in the January 1957 issue of "The Journal".

Garden Work in April

Preparation for the planting of trees and shrubs should be done in April and if the plants have not already been ordered from a nurseryman the order should be placed as soon as possible. Most of the work in the flower garden this month is in preparation for the spring bedding plants. If hardy annuals and biennials are planted now while the soil is still warm, they will make growth before winter and will flower early in spring. If planting out is left later than April, only a poor or later spring display will result, as the plants will not have had a chance to make any growth before the cold weather.

Gladiolus corms that are being lifted for storing may at this time of the year be placed in the sun to dry off. They should never be left out overnight, but should be brought inside and put in a dry and airy shed. Before the corms are stored they should be dusted with DDT or lindane to control thrips or other insect pests that may be present.

Light, surface cultivation will control weed seedlings, plants will make better growth, and rain will penetrate the soil instead of caking the surface and running off.

Dahlias

In the warmer districts dahlias may be treated as ordinary perennials and the stems cut back to 4in. to 6in. above the soil, except where the clumps have become very thick and it is desirable to lift and divide them.

In areas where more severe frosts are experienced the tubers should be lifted when the stems have died back, dried off in any airy shed, and then stored in a cool but frost-free position.

Labels should be attached to the stems and should give the approximate height and colour (for example, dwarf, red) where the name of the variety is not known. This saves confusion and planting difficulties next season, as if the tubers are not labelled, colours and heights cannot be correctly arranged. Dusting the tubers with DDT before storing them for winter should keep them free from slaters and similar pests.

Bedding Plants

Annuals such as clarkia, cornflower, nigella, calendula, godetia, and larkspur which will survive the winter in warmer areas can be sown in open spaces in the border for flowering early in the season. The seed can be sown either in drills in a sunny position or broadcast thinly in drifts where it is to flower.

The first method simplifies weeding, but the seedlings will not do so well if they have to be transplanted. When the second method is followed the seedlings should be thinned out as they grow until finally they are from 8in. to 9in. apart. Plants sown in drills may be transplanted toward the end of August, provided conditions are suitable, to positions where they are to flower.

Partners in Progress

For 75 years, the New Zealand story has been one of continuous enterprise, progress and achievement; and in all that has been done, the ships have been your willing partners and your faithful servants. Indeed, this story of success may well be said to have begun with a ship.

DUNEDIN

The Albion Shipping Company's Clipper "Dunedin" (1,200 tons) sailed from Port Chalmers February 15th 1882, arrived London May 24th, with the first-ever cargo of frozen meat, comprising 4,311 carcases Mutton, 598 carcases Lamb, 22 carcases Pork, 2,226 Sheep Tongues.

WELLINGTON STAR

Today, the Blue Star Line's Motor Vessel "Wellington Star" of 11,994 tons is typical of modern ships in the New Zealand trade. She is ten times as large as the "Dunedin". She carries 21 times as much Mutton and Lamb (108,823 carcases) as well as 7,294 quarters of Chilled Beef, 10,029 packages of frozen Beef, Pork and Sundries, 60,652 cartons of Butter and 60,520 cases of Apples. She can make the voyage Auckland-Dunkirk in 31 days—less than one-third of the time taken by the "Dunedin".

Thus, over the years, have the ships played their part in New Zealand's continuous development. They have more than kept in step with the achievements of producers, for ship-owners must look far ahead. The ship that is built today will still be in service 20 years hence and must be able to handle the trade of the future, as well as that of today. As the Lines join in celebrating the 75th Anniversary of the dispatch of the first shipment of frozen meat, they look forward with confidence to the developments which have yet to come.

Issued in the interests of mutual understanding by

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED

Perennials

Herbaceous perennials that are dying down and looking untidy should be kept trimmed by cutting back the flower stalks as they turn yellow. Provided that the stems are not cut back until they die, the food from the stems is returned to the crown of the plant to be stored for the following season. Also, as dying perennials are cut back, late flowering ones are shown to best advantage with no untidy foliage or growth round them.

Stalks of 4in. to 6in. long can be left to serve as markers during winter when cultivation is carried out, and can be cut right back when the new growth begins in spring. Clumps of perennials that have not been lifted or divided for a few years and that have become overcrowded may be divided toward the end of April or as soon as they have died down completely.

Better results are obtained the following season if the younger pieces from the outsides of the clump are replanted. The centre, though larger and apparently more vigorous than the outside pieces, is the oldest part, and the resulting growth and flowers from the centre will be comparatively poor.

Most perennials do best when they are divided every 3 or 4 years, but exceptions such as peony, gypsophila, and geum may be left if they are looking healthy and not showing any decline. Peonies can be left for up to 10 years in the same position, but a few of the more vigorous perennials may need dividing every second year if they are growing in warm, light soils.

Cuttings

Hard-wood cuttings may still be taken as was described in last month's notes. A sprinkling of sand along the bottom of the trench will help the cuttings to root and will also aid in the drainage of the soil. Privet, *Lonicera nitida*, roses, escallonia, the shrubby veronicas (*Hebe*), buddleia, and tamarisk are all suitable for propagating in this way. After the leaves are removed from the lower part of the cuttings they should be inserted in the soil to about half their length.

Lawns

New lawns can still be put down in northern districts in early April, but it is getting rather late in the season, and a spring-sown lawn may come away better than one sown too late in autumn.

Renovation can be carried out on old lawns this month, as the grasses are fully established and will not die out as new plants would during winter. Any flatweeds should be removed and the lawn mown closely and then raked to remove moss and weed runners. Topdressing with sifted soil will help to fill up depressions in the surface, but filling should be gradual, light dressings of soil being used to allow the grass to grow through successive layers. If more than about ½in. is applied at a time, the grass is likely to die, because it cannot penetrate the depth of soil.

Where the lawn has become very compacted, either through bad drainage or a great deal of traffic on it, aeration will encourage more growth and prevent patches of turf dying out during summer. An ordinary garden fork used as described in the article on lawns in the February issue will do the job satisfactorily.

Organic Manure

Organic material incorporated with the soil in the form of compost or well-rotted animal manure improves the drainage, water-holding capacity, and texture of the soil. By the addition of humus a heavy clay soil can be made more friable and easier to work and a sandy type can be made to grow better plants by improving its fertility and water-holding capacity.

At this time of year there is usually a fairly large amount of garden rubbish that can be used to make compost. Diseased plant material should be burnt, but almost everything else, including weeds, fallen leaves, and light hedge trimmings can be composted. It is not advisable to dig very much fresh organic material into the soil late in autumn, especially if the soil is heavy or cold, because decomposition is very slow during the colder months. Weeds which have gone to seed should not be dug in at any time, because many of the seeds will germinate even after they have been buried for many months.

Sweet Peas

Where winters are not too severe sweet peas can be sown now for flowering in late winter and early spring. To get the best results the ground should be dug to a depth of about 12in. and well-rotted animal manure incorporated in the lower level of the trench. Well-drained soil in a warm, sunny position sheltered from prevailing winds is ideal. The supports should be placed in position before the seed is sown, and a dressing of 1oz. to 2oz. of lime to the square yard, worked into the soil before sowing, will be an advantage where sweet peas are to be grown.

Hard-wood cuttings of hedge plants such as *Lonicera nitida* root easily if taken at the end of April and inserted in well-drained soil.

Hedge Plants

The ground for planting specimen trees and shrubs is usually well prepared and fertilised, but hedge plants are too often put in soil which has had little or no preparation. To encourage the plants to come away well and to form a strong growing hedge they should be treated in the same way as specimen trees. Where a long hedge is to be put in a trench the length required should be dug about 2ft. wide and 18in. deep. Well-rotted organic manure should be incorporated into the lower level of the soil. A light dressing of blood and bone at about 2oz. to the square yard will also help the plants to make a good start.

Though the more popular kinds of hedge plants are comparatively hardy in the latitudes to which they are suited, they will benefit very considerably in exposed situations if they can be given some protection from strong winds for a few months after they are planted. Low screens of sacking or brushwood attached to temporary wooden frames may not be very attractive, but they will protect the young plants until growth is stronger and the weather is warmer.

A Jumper with Small Cable Pattern

NEAT and unusual is an apt description of the jumper with the small cable pattern illustrated here. Instructions for making it are given below.

ABBREVIATIONS: K., knit; p., purl; st(s)., stitch (stitches); foll., following; patt., pattern; rep., repeat; sl., slip; p.s.s.o., pass slipped stitch over; w.r.n., wool round needle; inc., increase; cont., continue; fin., finishing; beg., beginning; dec., decrease; rem., remaining.

Materials: 5oz. of 3-ply wool; 2 No. 9 and 2 No. 4 knitting needles.

Measurements: Bust, 34in.; length, 18½in.

Tension: About 6½ sts. to 1in. over patt.

The Back

Using No. 9 needles, cast on 92 sts., and work in k. 1, p. 1 rib for 3in.

Change to No. 4 needles and work in the foll. patt.:—

1st row: P. 2, * k. 3, p. 2, k. 3, p. 12. Rep. from * 3 times more, k. 3, p. 2, k. 3, p. 2.

2nd row: K. 2, * p. 3, k. 2, p. 3, k. 12. Rep. from * 3 times more, p. 3, k. 2, p. 3, k. 2.

3rd row: Change to No. 9 needles, p. 2, * sl. 1, k. 2, p.s.s.o. the 2 sts., p. 2, sl. 1, k. 2, p.s.s.o. the 2 k. sts., p. 12. Rep. from * 3 times, sl. 1, k. 2, p.s.s.o. the 2 k. sts., p. 2, sl. 1, k. 2, p.s.s.o. the 2 k. sts., p. 2.

4th row: K. 2, * p. 1, w.r.n., p. 1, k. 2, p. 1, w.r.n., p. 1, k. 12. Rep. from * 3 times more, p. 1, w.r.n., p. 1, k. 2, p. 1, w.r.n., p. 1, k. 2.

Change to No. 4 needles. Rep. last 4 rows twice more.

13th row: P. twice into first st. (side inc.), p. 11, * k. 3, p. 2, k. 3, p. 12. Rep. from * 3 times more, but work twice into last st.

14th row: K. 13, * p. 3, k. 2, p. 3, k. 12. Rep. from * 3 times more, ending k. 13 instead of k. 12.

15th row: Change to No. 9 needles. P. 13. Rep. from * of 3rd patt. row 3 times, ending p. 13 instead of p. 12.

16th row: K. 13. Rep. from * of 4th patt. row 3 times, ending k. 13 instead of k. 12.

Change to No. 4 needles. Rep. 13th to 16th rows twice more, but inc. 1 st. each end of 17th and 21st rows, and allow for the extra sts. in the foll. rows. These 24 rows form the patt. Cont. in patt., inc. each end of every 4th row, working the inc. sts. into reverse fabric until there are 112 sts., then cont. straight, working across all sts. in patt. until work measures 17½in., fin. after a wrong-side row.

Shape Top of Sleeve and Shoulders

Cast off 2 sts. at beg. of next 4 rows, then dec. 1 st. at each end of every row until 92 sts. remain. Cast off 15 sts. at beg. of next 4 rows. Cast off rem. sts.

The Front

Work exactly as for back until work measures 16in., fin. after a wrong-side row.

Next row: Patt. 51, cast off 10, patt. to end. Cont. on last set of 51 sts., dec. 1 st. at neck edge on next 7 rows, then on next 4 alternate rows, but when work measures 17½in., fin. at side edge, work thus:—

1st row: Cast off 2 sts., patt. to end.

2nd row: Patt. to end.

Rep. last 2 rows once more, then dec. 1 st. at sleeve edge on next 6 rows. Now cast off 15 sts. at beg. of next 2 alternate rows.

Rejoin wool to neck edge of other sts., and work this side to match.

The Armbands

Join shoulders together, then measure 6in. either side of shoulder seam and mark with pins. Using No. 9 needles, pick up and k. 84 sts. between pins and work in a k. 1, p. 1 rib for 1in. Cast off in the rib.

The Collar

Using No. 9 needles and holding right side of work toward you, pick up and k. 120 sts. all round neck edge, beg. at centre front, turn.

Work in k. 1, p. 1 rib for 2½in. Cast off in the rib.

To Make up

Press work on wrong side with a warm iron and a damp cloth. Sew up side seams. Turn over collar.

Reconditioning and Care of Wooden Furniture

By DAPHNE EILERS,
formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

FREQUENTLY furniture which has become scratched and shabby from long wear or misuse is relegated to a shed or scrap heap because it is thought the cost of repair is not justified. In many cases replacements are inferior both in the materials used in construction and in the workmanship. Many of these old tables, chairs, or other pieces can be resurfaced cheaply provided the owner has the time, patience, and some knowledge of woods.

BUYING furniture second-hand is an excellent way of economising in the purchase of household requirements, provided the buyer is able to inspect articles closely before purchase. Much of the old-type furniture offered at auctions is of sound construction and made from better timber than is generally used today for similar articles. In this way many attractive pieces may be gathered for the home at a relatively low cost. No matter how old furniture is, provided it is still sound structurally, it will respond to treatment. Often an old dresser or tallboy which is painted and scarred is found to be good heart kauri or well-grained oak when the layers of paint have been stripped from it.

Inspection and Treatment for Borer

Before second-hand furniture is bought it is essential to inspect it for borer. If borer infestation is bad, it is wiser to reject the article, unless the affected parts can be inexpensively replaced. Borer generally attacks soft woods, and where plywood has been used for backs of cabinets or dressing tables the infestation is often concentrated in the plywood, with the rest of the article comparatively free of holes. Plywood portions can be replaced and the remaining affected wood treated with a mixture of either pentachlorophenol or metallic naphthenate and kerosene. The solution either can be brushed on and allowed to penetrate the holes, or can be injected into the holes with a syringe or oil-can. As good penetration is most important, treatment should be repeated several times. When completely dry the holes may be filled with plastic wood and smoothed off.

Repairing

Any repair work to be done to furniture should be done at this stage. Any loose joints should be re-glued and tightened, borer-infested wood replaced, and any structural alterations done.

Removal of Paint or Varnish

There are many paint and varnish removers on the market which are satisfactory when used strictly according to instructions. Some of these are caustic preparations, and great care should be taken to avoid contact with the skin or clothing. None should be left about where children may have access to them.

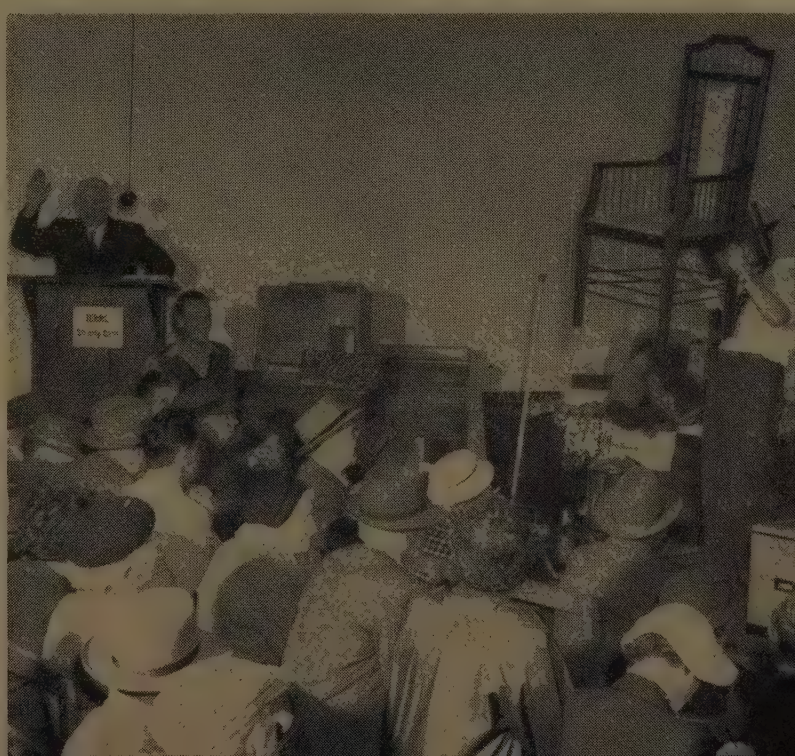
Old polish can also be removed with a strong solution of washing soda and hot water. This is wiped on to the wood and then rubbed down vigorously with scrim. For best results a small area of the article should be dealt with at a time. When washing soda or a caustic solution has been used to remove the old finish the woodwork should be washed down with a vinegar solution to neutralise any remaining alkali (1 tablespoon of vinegar to 1 cup of warm water). All traces of a caustic solution particularly must be removed, as it is liable to discolour the wood if allowed to penetrate. Commercial preparations usually give directions for procedure after their use.

The article should then be left 24 to 48 hours to dry thoroughly before further reconditioning work is done.

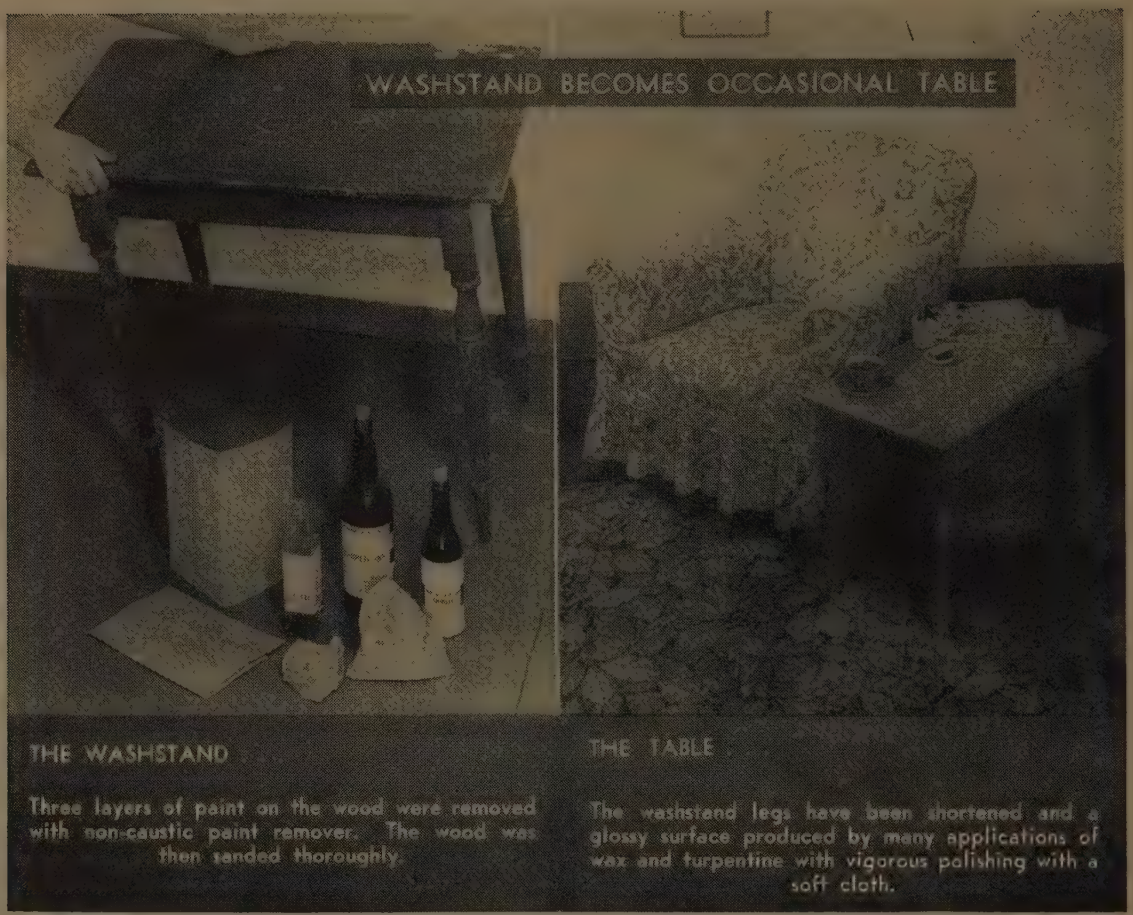
Sanding

Whatever finish is to be given the wood it will require thorough sanding to remove the last traces of paint or varnish and to produce a fine, smooth surface. For best results fine glass paper should be wrapped round a small block of soft timber or woodpulp wallboard and the surface sanded with the grain. Perfect flatness cannot be achieved when the glass paper is held over the fingers alone, and the edges of the article lose their definition.

Coarse glass paper may be used at first if the work is rough. Further sanding can be done with increasingly fine glass paper. However, a coarse paper should not be necessary with resurfacing, as the surface will already be relatively smooth. A coarse paper should never be used on a fine-grained wood.



Much of the old-type furniture → offered at auctions is sound and will respond to reconditioning. Sparrow photo.


WASHSTAND BECOMES OCCASIONAL TABLE
THE WASHSTAND
Three layers of paint on the wood were removed with non-caustic paint remover. The wood was then sanded thoroughly.
THE TABLE
The washstand legs have been shortened and a glossy surface produced by many applications of wax and turpentine with vigorous polishing with a soft cloth.

[*Sparrow*

Dents and Bruises

If the surface is marred by dents and bruises, they can be removed or made less obvious by placing a damp cloth over the spot and pressing it with a hot iron. The fibres of the wood will swell and fill the dent mark.

Preliminary Oiling

At this stage if the piece of furniture is to be finished in any way other than painting, it is as well to give it a thorough rub down with an oily cloth. This will give some idea of its finished colour if left unstained, and will show up any imperfections. This layer of oil must be well rubbed in with a soft, lint-free cloth. For better penetration the oil may be mixed with a little turpentine.

Filling Nail Holes and Other Small Holes

Nail holes and other small holes can be filled with putty and smoothed off with a putty knife. The putty will cling better if the wood is just moistened with oil. The putty may be tinted to match the wood.

Another method is to mix a little glue with some of the sawdust from sanding and fill the holes with that. Plastic wood may also be used.

Staining

The trend today is for natural-coloured woods with little or no staining. However, staining may be necessary if the article is to match other furniture. There are two methods of staining:—

1. **Surface staining:** The stain is made up of a mixture of pigments which is brushed on to the surface of the wood where it dries, leaving an opaque layer. The stain does not penetrate the wood fibres. Some commercial preparations are combinations of stain and varnish. With these there is very little penetration by the stain, so they can be said to be surface stains. This method does not give lasting satisfaction, as scratches and marks readily show.

2. **Body staining:** The stain is applied as a wash. Care must be taken that the application is quite even and that excess stain is not left on the surface. The simplest method to produce dark staining is with creosote diluted with turpentine to give the desired shade. This stain will dry half a shade darker than when wet. Where accurate matching is necessary it may be wiser to buy commercial spirit stain or water stain and follow directions. The stain must be allowed to dry completely before the next step is taken.

Types of Finishes

Whatever finish is used on the wood the aim is the same: To enhance the natural beauty of the wood by bringing out the colour and the depth

of grain and to protect the wood. There are a number of choices of finish, depending on the type of furniture to be done.

Oil Polishing

Oil polishing is the simplest finish, but developing a good lustre takes a fairly long time. However, it is an excellent finish for all types of furniture, including table tops, since it is impervious to water, has a good degree of heat resistance, and does not show scratches.

Boiled linseed oil (2 parts) mixed with turpentine (1 part) is applied with a soft cloth, care being taken to give an even application of oil. The turpentine helps the oil to penetrate the wood.

The oil must be rubbed in thoroughly and then polished with a clean lint-free cloth for 15 to 20 minutes and left for 2 to 3 days before the second application. Subsequent coats of oil can be given once a week, with a thorough polishing after each application to remove excess oil and to bring up a lustre. The number of applications varies according to the absorbtive properties of the wood.

A coarse-grained wood may need only 4 or 5 coats of oil, and a fine-grained wood 12. After that the furniture should be rubbed down once a week with an oily cloth and then polished with a soft rag. The treatment may seem a little tedious, but will be justified by the results, as the wood will take on a lasting, lustrous sheen. Many antique furniture pieces possess this lustre as a result of many years of oil polishing.

Wax Polishing

Though wax polishing will not give such a high polish as french polishing, it is a very much simpler finish for an amateur to attempt. Any wood may be wax polished, but best results are obtained with the more coarsely grained woods. The wood may or may not be stained, according to preference.

A mixture of beeswax and oil of turpentine is used. This mixture must be of a workable consistency and can be prepared in either of the following ways: The wax may be shredded finely and the turpentine poured over it, and the two left until they combine. The wax may be melted, removed from the source of heat, and the turpentine poured into it.

There are no hard-and-fast rules for quantities, but a medium thickness is easiest to work—about the consistency of soft butter. Some prefer to work with a thinner mixture, in which case more turpentine may be added. If the mixture seems too thin, it may be thickened by melting a little more wax and adding the original mixture to it.

The mixture must be allowed to cool before it is applied to the wood. Turpentine is used only to assist in making a thin, even application of wax. A polish can be produced on wood by rubbing it with solid wax and polishing, but this is very laborious and possible only on a flat surface. No polish can be raised until the turpentine has evaporated.

The wax-turpentine mixture is applied to the wood with a soft cloth. A second cloth is used to rub off excess wax, and a third cloth is rubbed vigorously over the surface to produce a polish. The more vigorous and longer the rubbing is the higher the resultant polish will be. The whole process is repeated until the required degree of polish is reached. All rubbing should be done along the grain of the wood. Any wax-turpentine mixture left over will keep if it is put into a bottle or jar and corked securely.

French Polishing

French polishing is an art acquired only after years of training and practice. The beginner cannot expect to produce a perfect piece of work at first. If he wishes to learn something of the method he would be wise to seek advice and instruction from an expert, or to study some of the numerous books on the subject.

The principle of French polishing is to impregnate the wood with shellac until no more can be absorbed and then to produce a high lustre with a cotton burnishing pad. Either brown shellac or bleached (white) shellac may be used, the choice depending on the colour of the wood to be polished. White shellac is usually best for light-coloured woods.

The polish is made by dissolving shellac in methylated spirit (5oz. of shellac to 1 pint of methylated spirit). The shellac should be placed in a glass or stone jar, the methylated spirit poured over it, and the whole covered and allowed to stand 2 to 3 hours with an occasional stir to hasten the dissolving of the shellac. Shellac should never be stored in a metal tin, as it will discolour.

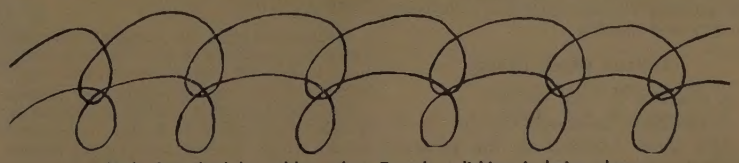
The polish is applied with a pad made from wadding and clean, old cotton cloth. This pad is called the rubber. To make a rubber a piece of wadding 6in. by 9in. is folded in halves. This pad can then be moulded in the hand into the shape of a half pear. A small amount of polish is applied to the wadding and the wadding is then covered smoothly with two layers of the cotton cloth. The edges of the cloth are drawn up round the pad and held in the operator's hand.

The pad is pressed on to a flat, clean surface or the palm of the hand so as to force a little polish out, and is then ready for use. The rubber should be just moist with polish. It is drawn rapidly across the grain of the wood to cover the entire surface being worked and a series of circular rubbing movements are made over the surface. These circular movements must overlap one another (see diagram below). As the rubber dries a little the pressure on it should be increased.

Sometimes the pad needs to be moistened with a very small quantity of raw linseed oil to keep the rubber moving smoothly. Too much oil will ruin the finish. A fingertip moistened with oil and then put on to the rubber will be sufficient. As the rubber dries out a little more polish can be added to the wadding, the cover drawn over again, and the "bodying-in" process repeated until there appears to be no further absorption of polish. The work should then be protected from dust and left for at least one day.

The surface should then be given a light sanding with a fine glass paper to ensure absolute smoothness, and the resultant dust removed. Further treatment should be given with day intervals between until no more absorption takes place, even after a lapse of 2 or 3 days. The rubber when not in use should be kept in an airtight container to prevent its hardening.

"Spiriting-off" is the next process. This consists broadly of washing the surface with methylated spirit. When saturation point is reached with bodying-in and the wood has stood for 2 to 3 days a little polish (about three-quarters the amount previously used) is placed on the rubber. A small amount of methylated spirit is also used to bring the rubber to the desired degree of moistness. It should be just damp. When the rubber dries out it is again moistened with a little less polish and a little more spirit until spirit alone is used.



Path described by rubber when French polishing is being done.

Spiriting-off brings out the gloss of the finish. Extreme care must be taken to avoid over-moistening the rubber, as the spirit will dissolve the shellac and distort the surface. There should be only sufficient to soften the shellac very slightly and to allow it to be smoothed and polished. As the polish comes up the circular rubbing motion should be abandoned and the wood rubbed only with the grain. A final polishing should be given with a soft, clean rubber. The work should then be protected from dust and left to harden.

Brush Polishing

Brush polishing may be the alternative for those who wish to produce a polished surface akin to that produced by french polishing. Even coats of the shellac mixture given for french polishing are brushed on the surface with a fine, clean brush in the direction of the grain. Quickness in laying on the coat is essential, as the mixture dries quickly.

If a patch is missed, the worker should not attempt to go back over it again. The whole article should be left to dry and when the next coat is applied care can be taken to cover the area missed. Between each coat the surface should be sanded lightly with a fine glass paper. After the final coat has dried thoroughly the surface can be burnished to a high gloss with a cotton rubber.

Table Finish

For a dining room table an oil finish is usually satisfactory, but some people prefer to have a higher gloss. To produce this the table top can be given a coat of shellac and when thoroughly dry a light sanding and a final coat of a clear varnish.

"Antiquing"

Finishes of the type already described may not be desired. If a painted surface is preferred but also something different is wanted, either of the two methods given for "antiquing" painted furniture may be useful.

The article will need to be cleaned and sanded as described earlier in the article, given an undercoating, and then painted with two coats of paint of a desired colour. Twenty-four hours should elapse between each coat, but before the antique mixture is applied 48 hours should be allowed for the final coat of paint to dry and harden.

Antique Glaze (Dark)

3 tablespoons of turpentine
½ teaspoon of raw umber
½ teaspoon of raw sienna
1 tablespoon of varnish.

Mix these together to the consistency of cream.

Light Antique Mixture for Use on Coloured Paint

1 part of white enamel paint
1 part of turpentine
A few drops of linseed oil.

Mix these together thoroughly.

The mixture chosen should be applied with a clean brush to the piece of furniture, one section at a time, and the glaze allowed to set for a few minutes. Then with a clean, soft, lint-free cloth all the glaze in the centre of the section should be wiped off and the edges and corners left untouched. The worker should wipe from the centre outward toward the edges and corners. In this way the finish will be concentrated in the corners, and the centre part of each section should have practically nothing but the base paint showing. When dark antique glaze is used a dry brush may be dabbed over the darkest areas before the surface is left to dry.

When a finish of this type is used it is best to complete one section before passing on to the next. For example, with a dressing table the top should be completed first, then the sides, and then the front in workable parts.

Care of Wooden Surfaces

To keep furniture in good condition it should be wiped down and polished once or twice a year with a mixture of two-thirds boiled linseed oil and one-third turpentine shaken well together and applied with a soft cloth. This mixture may also be used on floors and panelling, where its regular application will produce a good lustre. With this mixture there is no danger of the floor becoming slippery.

Other polishing mixtures which may be used regularly are equal parts of boiled linseed oil and vinegar, equal parts of boiled linseed oil and kerosene (for floors), or 1 cup of turpentine, 1 cup of boiled linseed oil, and 1 teaspoon of vinegar.

A small amount of one of these mixtures should be placed on a soft cloth and the cloth drawn first across the grain and then rubbed in straight strokes with the grain. A second cloth is used to polish the wood.

Water or Heat Marks

Water or heat marks may be removed by placing a small amount of camphorated oil on the mark, allowing it to stand for a few minutes, and then wiping it off. This treatment may be repeated until the mark fades. A good rub with the oil and vinegar mixture and a final polish should restore the original finish.

Scratch Marks

If small, scratches may be made less noticeable by rubbing in a little oil. If the wood is stained dark, a little of the stain may be applied before the oil. If the scratch marks are numerous and do not respond to treatment, it may be possible to resurface the part affected quite satisfactorily.

To Wash Varnished Wood

Sometimes it is necessary to wash down varnished wood to remove a greasy accumulation. The following solution is recommended:—

1 quart of boiling water
1 tablespoon of turpentine
3 tablespoons of lemon oil.

A piece of cheesecloth should be dipped in this mixture and then wrung out as dry as possible. A small piece of woodwork is then wiped down and a dry cloth used immediately to dry and polish it. If carving is to be cleaned, a soft brush will be found more useful than a cloth.

Finger marks on dark-painted wood can be removed by wiping the article with warm water to which a little vinegar has been added.

Cleaning Leather Upholstery

A PRESENT-DAY trend is toward increased use of genuine leather for upholstery. The initial outlay is high, but its lasting qualities and continued good appearance offset the original high cost; it is not difficult to care for if attention is paid to a few simple points.

Leather should be cleaned periodically by washing it over with a mild soap and a soft, damp—never wet—rag, removing any dirt or other soil marks lightly and quickly. Follow this by a quick rinse with a damp, non-soapy cloth, which should remove all traces of soap film, since any left on the surface readily collects dirt and dust. Finally polish the leather with a soft, dry cloth. Upholstery leather, being thinner and more pliable than shoe or saddle leather, does not require lubrication and polishing to keep it pliable. Bright sunshine will cause fading of the colour, but will not normally harm the leather, though too long exposure to strong sunshine is not recommended.

—*MAUD B. STRAIN,*
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Dunedin

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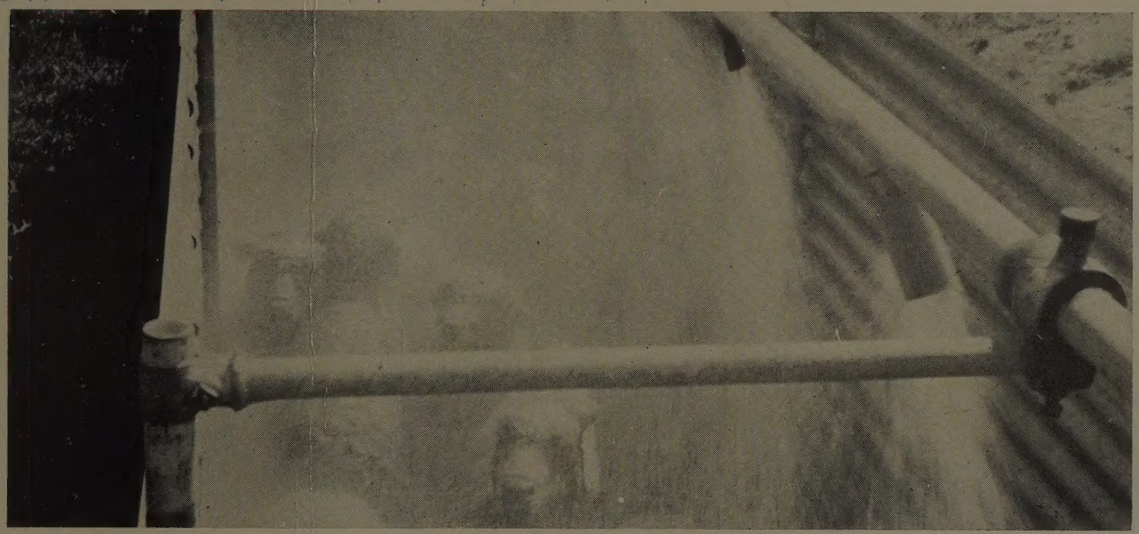
THOUSANDS OF FARMERS praise the STEWART SHEEPSHOWER

TOP: Sheep running freely without persuasion into the Stewart Sheepshower illustrates the advantage of the race type design.



CENTRE: Dense spray under pressure envelopes the entire area of the Stewart Sheepshower, ensuring effective control of parasites.

BOTTOM: Sheep leaving the Stewart Sheepshower show no signs of distress; there has been no risk of injury and they are soon grazing contentedly.

ACTUAL PHOTOGRAPHS SHOW WHY—

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- Prevents loss of condition and risk of injury to valuable sheep.
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